

THE 'AYN GHARANDAL ARCHAEOLOGICAL PROJECT: A PRELIMINARY REPORT ON THE 2010 AND 2011 SEASONS

Robert Darby, Erin Darby, with a ceramic report by Tiffany Key and Pamela Koulianos

Introduction

The site of 'Ayn Gharandal lies *ca.* 100km north of the Gulf of 'Aqaba, *ca.* 40km south-west of Petra and *ca.* 200m west of the mouth of Wādī Gharandal, on the eastern edge of the Wādī 'Arabah (GPS N 30°05.187', E 35°12.209'). Although the site has been visited by modern explorers (Frank 1934: 231-32; Glueck 1935: 39-40; Musil 1907: 193-97; Woolley and Lawrence 1915: 14-15) and archaeologists (Raikes 1985: 101; King *et al.* 1989: 207; Smith *et al.* 1997: 59-60; Henry *et al.* 2001: 1-19; Gibson 2007), the 'Ayn Gharandal Archaeological Project (AGAP) has collected the first stratified materials to date. At present, the AGAP has recorded the ruins of a Late Roman *castellum*, bathhouse and aqueduct system, as well as other unidentified structures to the west of the fort, to the south of the bathhouse and on the rocky cliff overlooking the *wadi* system on the east side of the site.

It has long been believed that the name Gharandal is derived from *Arieldela* listed in the *Notitia Dignitatum* (Or. 34.44) as the location of the *Cohors II Galatarum* (Musil 1907: 195, n. 20). It also appears in the Beer Sheva Edicts as *Ariddela* (frag. V, line 5). Alternately, it has been argued that Gharandal in the southern Ghawr is a more likely candidate for *Ariddela* (Walmsley 1998: 433-41). A total lack of any evidence from 'Ayn Gharandal confirming its identification leaves the ancient name of the place and the unit garrisoned there a matter of scholarly speculation.

Following the completion of the 2009 survey (Darby, Darby and Shelton 2010: 189-201), the AGAP carried out two seasons of excavations in 2010 and 2011.¹ The 2010 season focused on three squares (A:6/4; A:3/7; C:1/7) in the presumed Late Roman *castellum* and two squares (D:6/12; D:6/13) in the nearby *auxiliary* bathhouse situated *ca.* 60m east of the fort (Fig. 1). Owing to the substantial amount of collapsed mudbrick and stone debris, we were unable to reach occupation layers in the fort during the 2010 season. However, excavations in the bathhouse in 2010 yielded a wealth of data and numerous unexpected finds. In 2011, we resumed excavation in the *castellum* and two sondages were completed in portions of two squares (B:1/1; B:2/1) along the east curtain wall in an effort to identify the main gate. In addition, we collected ceramic materials from the surface of Area D1, which overlooks the *wadi* system. The following report offers a brief synopsis of the findings from these areas and our initial interpretations of the data collected in 2010 and 2011 at 'Ayn Gharandal.

Research Agenda

The 'Ayn Gharandal Archaeological Project (AGAP) seeks to contribute to our understanding of Jordan's rich and diverse cultural heritage through documentation and publication of the archaeological materials and site of 'Ayn Gharandal in Wādī 'Arabah. Our long term project goals are as follows: (1) investigate the occupational history

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1. 2010 site plan with squares.

of the site from the Nabataean to Early Islamic periods by means of systematic archaeological excavations and study seasons, (2) map and record its architectural remains using state-of-the-art technology, including both GPS and GIS, for inclusion in the MEGA-Jordan Database, (3) collect, analyze and publish the material culture recovered at the site and (4) preserve and protect the site and its ruins for future generations.

Excavation Strategy for the 2010 and 2011 Seasons

From the data collected in the 2009 survey,

seven specific squares from three areas were selected for the initial season of excavations in 2010.² Two squares within Quadrant A (A:6/4; A:3/7) and a third in Quadrant C (C:1/7) are associated with the remains of the *castellum*, two lie in the ruins of the bath complex in Quadrant D (D:6/12; D:6/13) and the final two are located near what was thought to be a possible domestic structure, also in Quadrant D (D:11/7; D:12/7). The squares associated with the Domestic Structure area were closed almost immediately because the walls identified in 2009 proved to be the remains of modern bulldozing. Overall,

2. The 2010 season began on 7 June and ended on 27 June, consisting of one week of survey and topographical mapping, and two weeks of excavation. The personnel for the 2010 season included Robert Darby (University of Tennessee) and Dr Erin Darby (University of Tennessee), the project co-directors; Fawwaz Ishakat (Hashemite University) was the surveyor. The 2010 DoA representative was Abdullah Rawashda. The area supervisor for the fort was Dr Carrie Duncan (University of Missouri - Columbia), who supervised excavation in squares C:1/7 and A:3/7. Dr Byron McCane (Wofford College) was the square supervisor for A:6/4 and A:6/3, which were also opened in the fort. Robert Darby was the area supervisor for the bathhouse and oversaw excavation in squares D:6/13 and D:6/12. Finally, Dr Jennifer Ramsay (SUNY

Brockport) had intended to oversee excavation in the possible domestic structure in squares D:11/7 and D:12/7 but was not able to work in the field due to injury. Dr Ramsay is also the team's archaeobotanist. Other field workers included nine *bedouin* as well as 26 students from Duke University, North Carolina State University, Elon University, Wofford College, State University of New York at Brockport and the University of British Columbia. Erin Darby directed the archaeological lab in 'Aqaba. Andi Shelton (independent scholar) performed the ceramic field readings at the close of the season, Dr Alysia Fischer (University of Miami - Ohio) performed the initial analysis of the glass, and Naif al-Zabin (American Center of Oriental Research) and Fatma Marii (Jordan Museum) conserved the site's coins and plaster *graffiti*.

squares were chosen based upon their potential for revealing important information about the construction, use and function of the structures contained within each area, as well as the nature and depths of the stratigraphic deposits at the site. In addition to excavation, we generated a 3D topographical map of the site (Fig. 2).

In 2011, three squares from the fort were the focus of the field season.³ The three squares are within Quadrants A and C (A:6/4; A:3/7; C:1/7) and are associated with the remains of the *castellum*. These squares were started in 2010 and reached bedrock in 2011. In addition, two small probes were excavated (in B:1/1 and B:2/1) to ascertain whether the fort's gate was located in the east curtain wall. Finally, structures on the rocky outcrop overlooking the *wadi* system

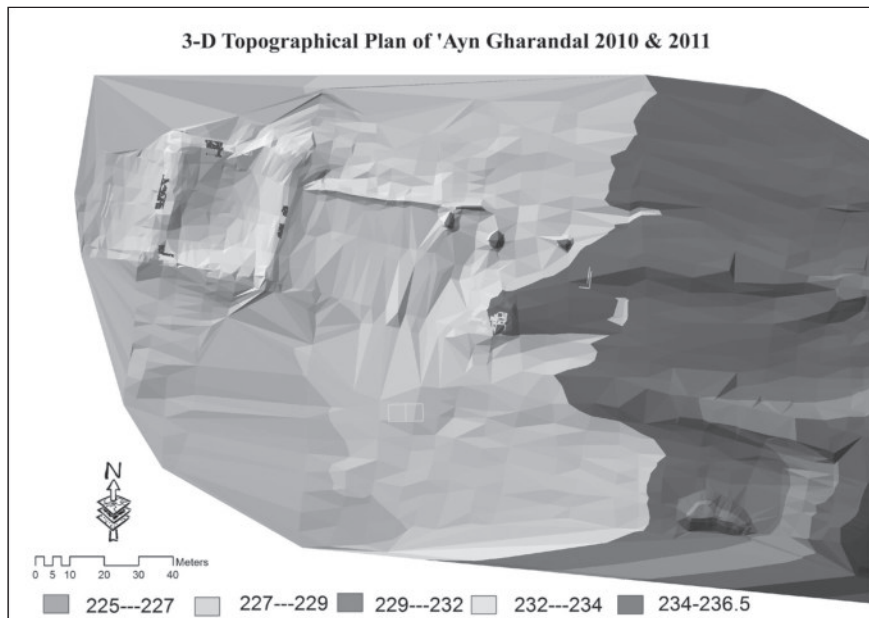
(Area D1) were surveyed in preparation for future excavation (Fig. 3).

Results from the 2010 and 2011 Seasons

The Late Roman Military Bathhouse

Excavation of square D:6/13 revealed two heated rooms of the bathhouse that had been partially exposed by looters. Recorded in the 2009 survey as the South and North Rooms, we can now securely identify the former as the *caldarium*, or hot room, and the latter as the *tepidarium*, or warm room. In addition, a third room was discovered adjacent to the North Room and probably served as the *frigidarium*.

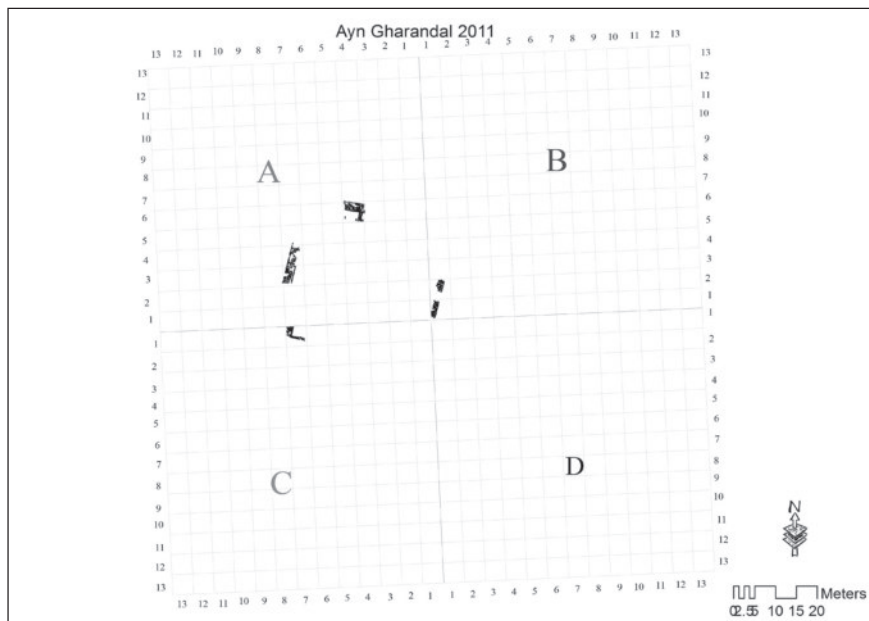
Investigation of the South Room (*caldarium*) revealed that the recessed heating pipes (*tubuli*) were still intact in its east and north walls



2. 3D topographic map of 'Ayn Gharandal.

3. The 2011 season began on 30 June and ended on 28 July, consisting of four weeks of excavation and an additional surface survey. The personnel for the 2011 season included Robert Darby (University of Tennessee) and Dr Erin Darby (University of Tennessee), the project co-directors; Fawwaz Ishakat (Hashemite University) was the surveyor. The area supervisor for the fort was Dr Carrie Duncan (University of Missouri - Columbia), who directed excavation in square C:1/7. Craig Harvey (University of Victoria) was the square supervisor for A:6/4 in the fort. Abigail Turner (University of Texas-Austin) oversaw excavation in A:3/7 in the fort. Finally, Robert Darby directed excavation in the two test probes along the east curtain wall (B:1/1; B:2/1). Other field workers included 10 *bedouin* as well as two students from the University of North Carolina - Chapel Hill and Carleton College. Erin Darby directed the archae-

ological lab in Aqaba, and Tiffany Key and Pamela Koulianos (North Carolina State University) performed ceramic analysis. Following the field season, conservation of the coins, metal artifacts, pottery and plaster was completed by Naif al-Zabin (ACOR Conservation Cooperative, American Center of Oriental Research), preliminary analysis of epigraphic finds was begun by Dr Christopher Rollston (Emmanuel Christian Seminary) and analysis of the metal artifacts was completed by Dr Stephanie Hoss (Small Finds Archaeology). The site's archaeobotanical material is currently under investigation by Dr Jennifer Ramsay (SUNY Brockport) and the zooarchaeological materials are being analyzed by Dr Austin Hill (University of Connecticut). Finally, Dr Alysia Fischer (University of Miami - Ohio) is examining the glass finds and Dr Nathan Elkins (Baylor University) is analyzing the numismatic materials.



3. Site grid with 2011 excavation squares.

(Fig. 4). We also uncovered a large plastered concrete fragment from the east wall containing at least two partial lines of Greek text and a *graffito* of a seated camel. Two additional *in situ* Greek *graffiti* were found adorning the east and west walls of the South Room. The delicate nature of these finds indicated that the South Room had not been exposed by looting as was previously thought (Darby, Darby and Shelton 2010: 189-201). Thus, excavations were halted before reaching floor level in an effort to preserve the inscriptions.

Clearing the North Room (*tepidarium*) of the bath complex confirmed that it had been looted to the level of its finely paved floor, a fact made apparent by the discovery of a large hole ripped through to the sub-floor hypocaust system, as well as several modern objects at

floor level, including a juice box, a rusted road sign and a large metal pipe. Despite the looting, the majority of the North Room remains remarkably intact. All four of its walls are still partially retain their original plaster and contain numerous *in situ* heating pipes (*tubuli*). The walls (*ca.* 1m wide) are constructed of roughly hewn blocks bonded with concrete and survive to *ca.* 3m in height. In addition, the east and west walls are topped with two courses of finely cut ashlar from which once sprang a barrel vault (Fig. 5).

Moreover, excavation also brought to light the full extent of two doorways that had been recorded previously at the level of their lintel stones (Darby, Darby and Shelton 2010: 189-201). One connects the North Room to a room lying to its west and the other connects the North and South Rooms. The presence of a door jamb in each of



4. South Room / *caldarium* of the bathhouse with *in situ tubuli*, facing east.



5. North Room / *tepidarium* of the bathhouse, facing south.

the doorways indicates the North Room could be closed off from the other two rooms, presumably to control the temperature of each (FIG. 6). Thus, the South Room, with only one doorway, was in all probability the *caldarium*, while the North Room functioned as the *tepidarium*, a fact further illustrated by its connection with the unheated West Room.



6. Door jamb and post with copper hinge in doorway between *tepidarium* and *frigidarium*.

Only a small part of the West Room was uncovered in the 2010 season (Fig. 7). The room was not visible in the 2009 survey, although we had observed that the wall separating the North and South Rooms continued to the west of the bathhouse. Excavation confirmed the presence of this West Room, which was – thankfully – spared from the looters. The identification of this room as the *frigidarium* is confirmed by the absence of *tubuli* in the walls and the presence of heavy paving stones that differentiate its floor from the suspended floor of the *tepidarium*.

Excavation of square D:6/12 uncovered a series of contiguous plastered mudbrick and stone walls forming the north, east and west walls of



7: West Room / *frigidarium* of the bathhouse, facing south.

a rectangular shaped room that stands immediately south-west of the heated rooms of the bathhouse. The room featured an exceptionally well-preserved paved stone floor surrounded on the north and west by a channel, 0.75m in depth and 0.50m in width, with a drain on either end. The form follows the typical plan of a Roman *latrina*. Moreover, the *in situ* plaster lining the north and west walls appears to have extended to a uniform level, ca. 0.5m above the drainage channel, suggesting that a wooden installation, perhaps a multi-seat toilet bench, once adorned the room (Fig. 8). The location of the latrine adjacent to the *balneum* probably allowed the latrine to make secondary use of water exiting the bath. Additional walls of the bath complex were also revealed immediately north of the latrine; these walls comprise at least two more rooms whose functions are, as yet, unknown.

Special Finds from the Bathhouse: Graffiti and Tubuli
Graffiti

While the architecture of the bath and its hypocaust system was exciting, one of the most important discoveries of the 2010 season was a corpus of well-preserved charcoal *graffiti* found *in situ* adorning the walls of the bathhouse; additional fragments were recovered from the surrounding debris. The discovery of the *graffiti* came first from the South Room or *caldarium*. The large fragment of plaster and concrete bearing the *graffito*, which apparently broke off from the east wall of the South Room, measures slightly less than a meter long and a half meter at its widest. It contains at least two partial lines of Greek text, which are currently under analysis, and a partially preserved zoomorphic figure.



8. The *latrina* facing north.

Based upon the distinctive rendering of the hind leg and foot, the image is clearly intended to represent a dromedary, possibly indicating the function of the site as a caravan stop (**Fig. 9**).

Between the North and South Rooms, the west interior face of the doorway also contained a faded but discernible depiction of an ancient boat. The vessel is shown with its bow facing left and at a slightly upturned angle. It has a large triangular sail and what seems to be a small flag or sail extending right from the top of its mast (**Fig. 10**). The hull of the ship is that of a traditional Roman sailing vessel with a curved prow and stern. In addition, two long rudders extend outward. Like the camel image, the boat

may also be associated with the important role that the site played in the Late Antique regional trade network that transported imported goods between the ports at Ayla and Gaza by means of camel caravans running along Wādī ‘Arabah.

The largest group of *graffiti* was found in the West Room / *frigidarium*. Excavation of this room uncovered two complete lines of an *in situ* Greek inscription flanking the doorway, several other faint or partial Greek texts and at least five additional figural *graffiti*, depicting both humans and animals. The *graffiti* decorate the small plastered wall to the south of the doorway leading to the Northern Room and are found at varying heights. Two naked human figures, one possibly



9. Graffito of seated camel from the South Room / *caldarium*.



10. Graffito of Roman sailing vessel from doorway between *tepidarium* and *caldarium*.

holding a strigil, appear on the lower portion of the wall. Next to them a possible Chi Rho is flanked by an additional as yet unidentified object / figure, while a schematized camel, a detailed fish and a possible ostrich are also present on the wall. To the north of the doorway, additional text can be seen emerging from the baulk. The south wall of the West Room also depicts two anchors and a circular emblem, along with an additional line of Greek text. At present all textual and figural *graffiti* are in the process of analysis for future publication.

Tubuli

Large numbers of *tubuli*, both fragmentary and complete, were recovered from the bathhouse in 2010. These consisted of two broad types: rounded rectangular / oval *tubuli* with thumb-hole perforations and round pipes more commonly associated with hydraulic installations (Figs. 11 - 12). In addition to the excavated materials, both types of *tubuli* were found *in situ* lining the walls of the two heated rooms. The *tepidarium* appears to have been fitted primarily with the round 'water pipe' variety, while the *caldarium* featured the more traditional oval version. The reason for this choice remains unclear. Further study of the *tubuli* from 'Ayn Gharandal may shed light on this and other questions.

The Late Roman Castellum

In 2010, three squares (A:6/4; A:3/7; C:1/7) were opened in the *castellum*, which were completed during the 2011 season. Owing to the large deposits of wind-blown sand, squares were initially laid out at 5x5m; 0.5m balks were retained after clearing the first 0.5m of sand. Owing to the



11. Rounded rectangular / oval heating pipe with thumb-hole perforation recovered from the bathhouse in 2010.



12. Round heating pipe of the 'water pipe' variety recovered from the bathhouse in 2010.

extensive mudbrick collapse and sand deposits, as well as the shorter season in 2010, we did not reach substantial occupation levels until 2011.

That having been said, at the very end of the 2010 season we identified the remains of a later cist burial. In 2011, this burial proved to be one of several burials located along the west wall of the fort (Fig. 13). In fact, one such burial cut through the north baulk of square A:3/7, which required us to open the adjacent square (A:4/7) in order to excavate the body properly. In the process of excavating the burial visible in the baulk, we uncovered yet two more burials in A:4/7, giving a total of five burials from the 2010 and 2011 seasons combined. The burials vary in size and dimensions, but all were poor in grave goods, with the exception of one burial shroud. Most of the bodies lie on their right sides facing south - south-east and seem to reflect various times and ages of death. The lack of consistency in burial technique and spatial organization indicates the bodies were probably not interred as part of a planned cemetery but were the results of separate *ad hoc* burials associated with this general area.



13. Later cist burial from square A: 3/7 excavated in 2010.

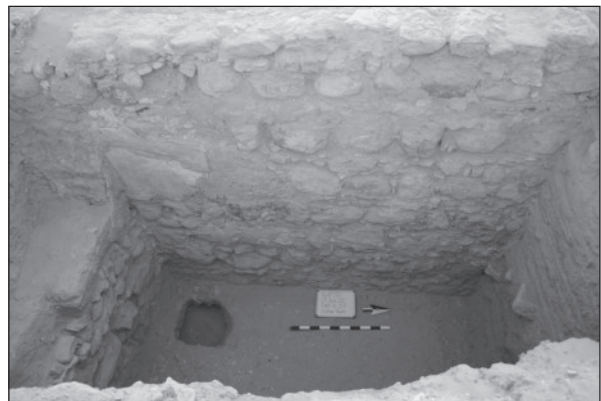
Aside from the later burials, the majority of data from the excavation relate directly to the Roman and Byzantine periods. We were able to ascertain the entire depth of the deposits inside three of the four curtain walls (north, west and south). Moreover, we were able to record the full measurements for the north, west and south curtain walls, which were preserved to *ca.* 3m in height and *ca.* 2m in width. They are made of a rubble and mud core with alternating boulder and chink facing courses that rest on stone socles *ca.* 0.1-0.2m wider than the walls. The stone walls appear to have been topped with mudbrick, which may have stood at a much higher elevation to judge from the amount of collapse excavated in the 2010 and 2011 seasons.

Additionally, we identified interior partition walls in two of the three squares (A:6/4; A:3/7), confirming that rows of rooms lined the fort walls and faced onto an open courtyard, as is common in other Late Roman *castella*. The partition in A:6/4 consists of mudbrick resting on a short stone socle only a few courses in height, while that in A:3/7 is a more substantial stone wall topped by mudbrick (Figs. 14-15). In both squares, the partition walls survive to approximately the same height as the curtain wall of the fort (*ca.* 3m). The third square (C:1/7) contained an additional stone wall as well, however, the discovery of a staircase on its west face and its proximity to the south-west corner tower suggest it may have provided access to the tower (Fig. 16).

We also uncovered several unexpected architectural features in the 2011 season. Excavation exposed a line of stone arches parallel with the north curtain wall in square A:6/4 (Fig. 17). The



14. Square A: 6/4, east wall of the fort with mudbrick partition wall in foreground.



15. Square A: 3/7, west wall of the fort with stone and mudbrick partition wall visible to left.



16. Square C: 1/7, south wall of the fort with stone wall and staircase.

arches span *ca.* 2.81m from pier to pier and were built of roughly hewn *voussoirs* that were finely finished on only one face. Gaps between the *voussoirs* were filled with packing stones. The arches appear to have supported ceiling beams in at least two rooms in A:6/4, one of which also yielded an assemblage of three complete vessels and an oil lamp (Fig. 18). The arches may provide evidence for a second storey along the north wall of the fort.

Excavation in all three squares revealed numerous fragments of painted plaster. More particularly, square A:3/7 yielded extensive remains of finely painted Greek *dipinti* that had fallen from the west curtain wall in antiquity (Fig. 19). The plaster fragments varied in size, but many contained several partial lines of legible text formed in clearly organized registers. Thus far, conservation efforts have preserved enough of the text to suggest the *dipinti* may be the remains of an official inscription set within a *tabula ansata*. Given the delicate nature of the remains and their importance, epigraphic analysis is ongoing.



17. Remains of a stone arch in square A: 6/4 with an in situ jug visible directly below.



18. Ceramic assemblage recovered from square A: 6/4 in 2011.



19. Remains of the Greek dipinti from square A: 3/7 with Abigail Turner.

Finally, although we previously hypothesized that the fort's gate lay in the north curtain wall (Darby Darby, and Shelton 2010: 189-201), excavation in A:6/4 revealed that we had observed not the gate, but damage to the exterior face of the wall. In 2011, two sondages excavated in Area B produced conclusive evidence for an arched gate in the center of the east curtain wall (Fig. 20). The debris within the soundings contained at least one finely cut *vousoir* with a mason's mark, suggesting that many materials may be recoverable in future excavation, including a possible building inscription.

Survey of D1

During the 2010 season, additional areas of the site were surveyed with GPS / GIS technology and, where appropriate, incorporated into the site grid. To the east of the main site and sitting on the ridge of the *wadi* is a large conglomeration of mud brick atop the sandstone. We had observed this area only on the



20. Sondage in square B: 2/1 with remains of a gateway in the east wall of the fort.

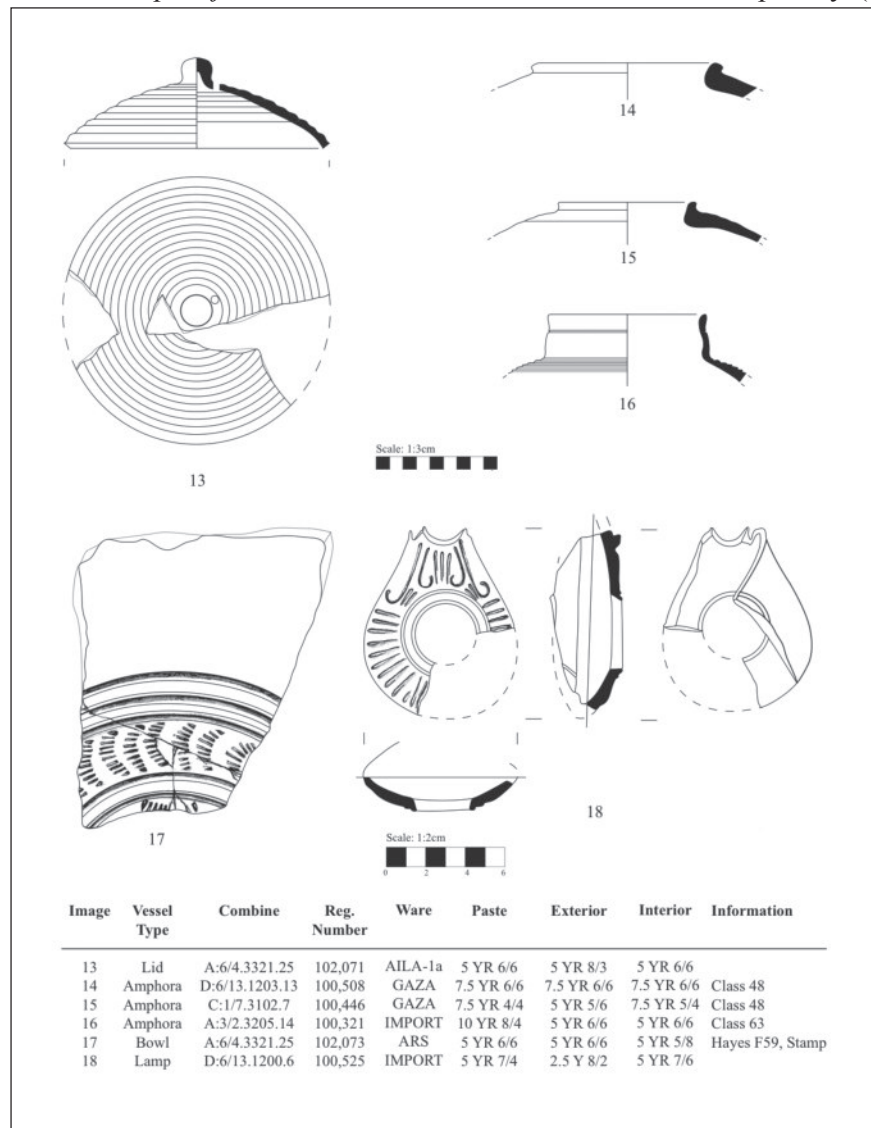
last day of the 2009 season. The area included an extensive scatter of pottery, with numerous Nabataean sherds. In addition, possible tombs are visible near the top of the mound, as well as built ashlar construction and mudbrick construction. In 2011 we noted that additional looting had taken place since the 2010 season, as indicated by looters trenches adjacent to the exposed architectural features. In response, we collected surface pottery from this area, now designated Area D1, in order to prepare for possible excavation with the aim of preventing further damage to the remaining materials.

Preliminary Ceramic Report (Tiffany Key and Pamela Koulianos)

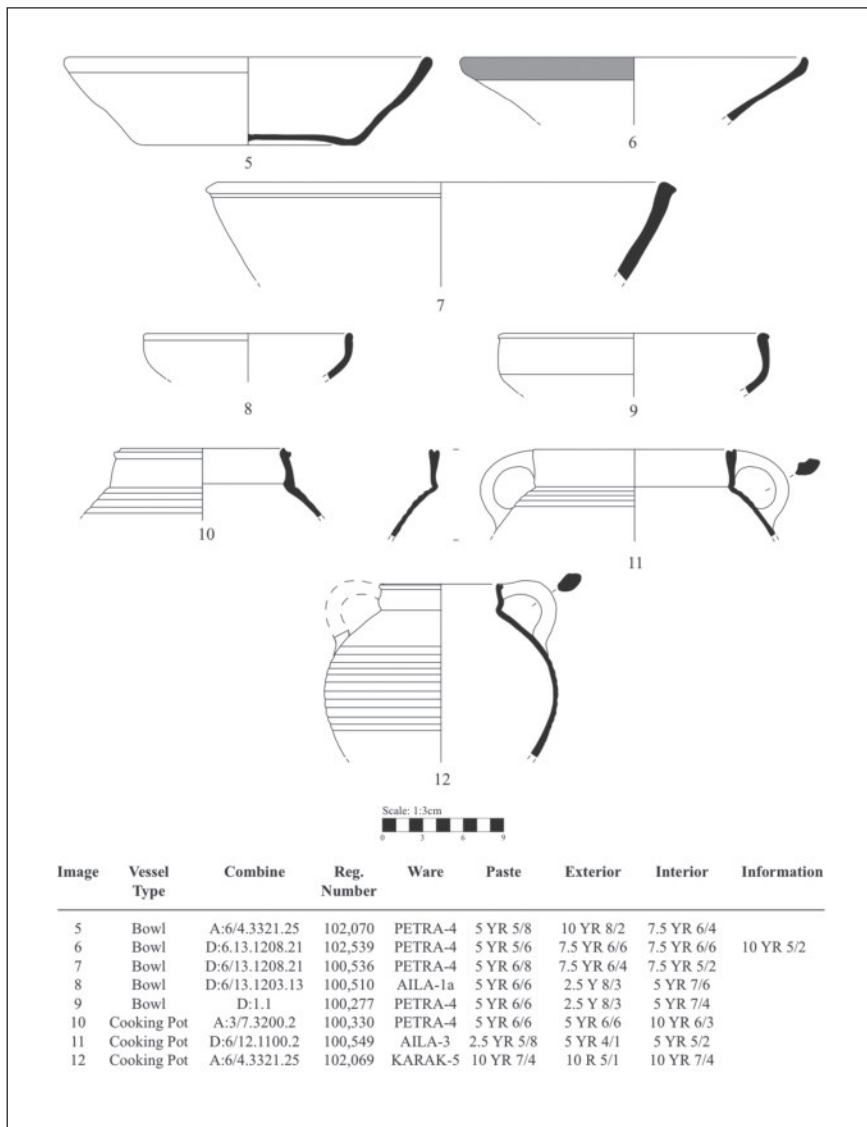
Ceramic Report from the 2010 Season

In the 2010 field season of the AGAP, a total of 1,117 sherds were collected from three areas of excavation: the fort, the bathhouse and an area originally identified as a domestic structure. The majority of sherds collected at the site were coarse wares (n = 1,011), which constitute *ca.* 90% of the site's pottery, while only a small percentage were fine wares (n = 69), or *ca.* 6%. The 2010 season was examined in the field by Andi Shelton and was later brought to the ceramics lab at North Carolina State University in Raleigh, North Carolina, USA. Subsequent to the 2011 season, the pottery from both 2010 and 2011 was analyzed together, a representative sample of which is depicted at **Figs. 21-23**.

The 2010 season yielded the site's first excavated pottery (**Table 1**). After reviewing the



21. Pottery recovered from the 2010 and 2011 seasons.



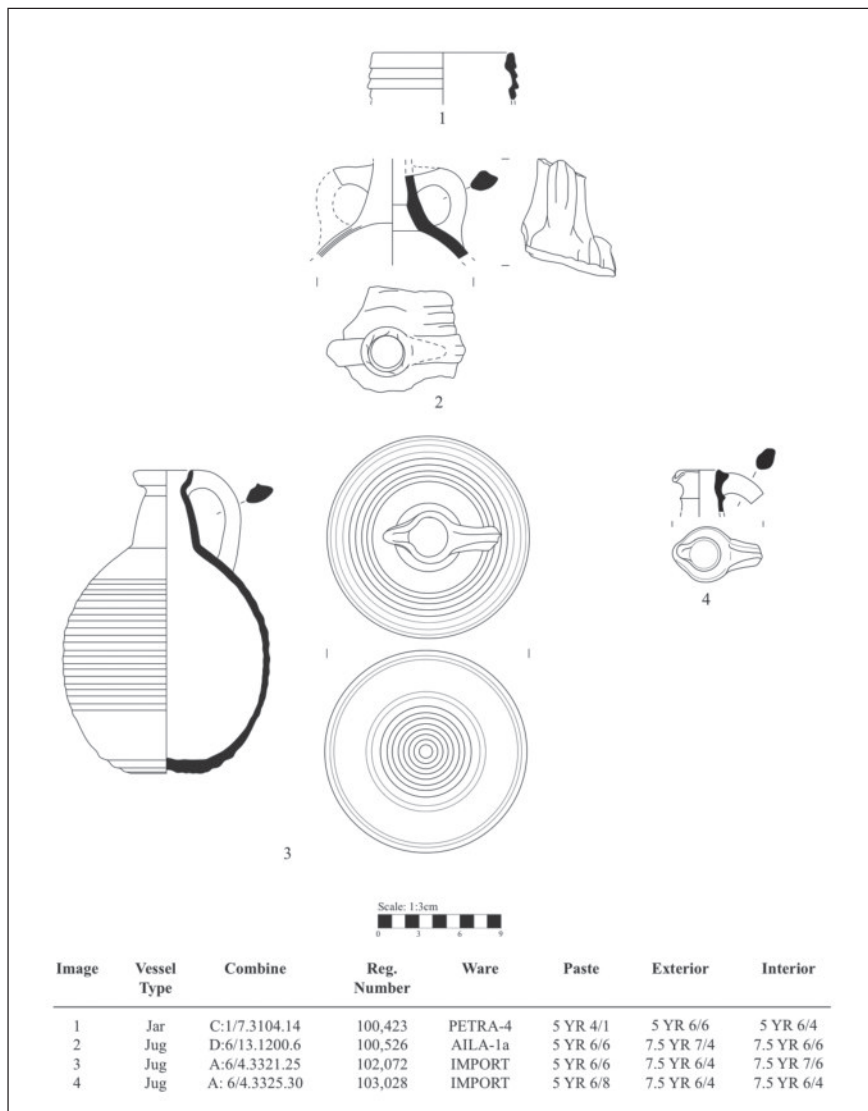
22. Pottery recovered from the 2010 and 2011 seasons.

ceramic assemblage it was not surprising that most of the sherds were of Ayla coarse ware. 'Ayn Gharandal's proximity to Ayla would help explain the prominence of Ayla ware pottery, although 'Ayn Gharandal has yielded some Ayla ware fabrics that are relatively uncommon at Ayla itself. These and further provenience studies may shed light on the trade relations between the two sites along the 'Arabah trade route. In contrast to the numerous coarse ware sherds, only a small number of imported fine wares were found, including one African Red Slip (ARS) and two Eastern Sigillata A (ESA) sherds.

The majority of the 2010 material was limited to surface finds and wind-blown sand deposits. Of the squares open in 2010, those in the fort

reached approximately 1m below the modern ground surface. As a result, dating these upper levels was difficult owing to the limited amount of material produced in the excavation. Although excavation in the bathhouse progressed deeper than that in the fort, these loci presented a mixture of materials that dated from the 2nd to the 6th-7th centuries AD, with a small amount of residual sherds that could be dated from the 1st century BC to the 1st century AD. These finds are not surprising given the fact that most earth loci in the bathhouse were comprised of sterile soil or wind-blown sand.

A relatively small collection of amphorae was recovered from the 2010 excavation (Table 2). The majority of the 28 sherds found were



23. Pottery recovered from the 2010 and 2011 seasons.

Table 1: Indicators from the 2010 Season (imported ware includes any coarse ware not labeled as Ayla, Nabataean or Central Jordan ware).

Area	Square	Ayla Ware	Nab. Semi-fine Ware	Nab. Fine Ware	Nab. Painted Fine Ware	Nab. Course Ware	Imported Ware	Central Jordan Ware	TOTAL
Fort	C:1/7	9	4	16	2	5	6	1	43
	A:3/7	13	7	6	0	10	3	2	41
	A:6/4	20	2	6	0	12	5	1	46
Bath	D:6/12	5	1	4	0	4	2	1	17
	D:6/13	13	0	0	0	7	5	7	32
Dom. St.		1	1	0	0	0	0	0	2
TOTAL		61	15	32	2	38	21	12	181

Table 2: Imported amphorae discovered during the 2010 excavations.

Area	Square	Gaza	Egypt	Palestinian	Unidentified Ribbed	Ayla	Unidentified Amphorae	TOTAL
Fort	C:1/7	1	0	0	0	0	1	2
	A:3/7	0	0	0	0	0	1	1
	A:6/4	2	1	0	0	1	0	4
Bath	D:6/12	0	0	0	0	0	0	0
	D:6/13	15	0	1	1	0	2	19
Dom. St.		2	0	0	0	0	0	2
TOTAL		20	1	1	1	1	4	28

from the bathhouse complex and, of these, Gaza amphorae dominated, while unidentified imports formed the second largest group (see Fig. 21: 16 for an example of the latter). Two Gaza amphorae indicators were identified as Peacock and Williams Class 48 (see Fig. 21: 14-15), dating to between the 3rd and 6th centuries AD. While the paucity of amphorae is unusual, this pattern resulted from the fact that excavation in the fort did not reach occupation levels in 2010.

Ceramic Report from the 2011 Season

In the 2011 field season, 4,095 ceramic sherds were collected, processed and analyzed. This assemblage represented finds from four squares located in the fort complex as well as material found from the surface survey collection of Area D1, a mound with architectural features near the site. At the start of the excavation, three goals were established for the ceramic investigation: (1) to determine the date of the collected material, (2) to identify the main pro-

duction centers supplying the fort – as evidence for local pottery production has yet to be discovered – and (3) to begin to examine the usage of the fort complex from a ceramic perspective. In order to accomplish these goals a compilation of diagnostic and non-diagnostic sherds was retained from the excavation. Sherds were characterized in the field as belonging to one of four broad categories: Ayla ware, Nabataean ware, unidentifiable (or imported) ware and amphorae. Table 3 displays the prominence of these forms by excavated area (excluding the survey area).

Chronological Range of the 2011 Pottery

Material from the 2011 excavations ranged broadly in date from the early 2nd to the 7th centuries AD. Three squares (C:1/7; A:3/7; A:6/4) reached bedrock, representing the lowest levels of the fort complex. In each of these areas, the lowest occupation levels were examined and a preliminary date range was determined. The lowest loci in squares A:3/7 and C:1/7 both

Table 3: Indicators from the 2011 season and the percentage of each category in the overall 2011 pottery assemblage.

Area	Square	Ayla Ware Sherd Count and %		Nabataean Ware Sherd Count and %		Unidentified Ware Sherd Count and %		Amphorae Sherd Count and %		Total Sherds
Fort	C:1/7	285	37.9%	99	13.2%	180	23.9%	111	14.8%	752
	A:3/7	258	18%	98	6.8%	952	66.3%	17	1.2%	1435
	A:6/4	499	36.7%	175	12.9%	378	27.8%	28	2.1%	1360
	A:4/7	35	40.2%	18	20.7%	16	18.4%	1	1.1%	87
AVG%		1077	33.2%	390	13.4%	1526	34.1%	157	4.8%	3634

produced assemblages that were primarily Late Roman (106-324 AD). Typical Late Roman cooking pots with a deep groove on the rim, Gaza amphorae and pottery from the Kerak plateau are common in the lowest loci in both A:3/7 and C:1/7. In square A:6/4, the pottery from the lowest loci ranged from the Late Roman to Early Byzantine periods (324-491 AD.). This conclusion is based on the presence of Gaza and Egyptian amphorae, as well as a painted bowl resembling the Early Byzantine painted ware found at Roman Ayla; these forms occurred in the same loci as Late Roman cooking pot forms. Early Roman / Nabataean (63 BC-106 AD) pottery was also found in all areas of excavation, but the relative scarcity of such pottery and the fact that it occurs with pottery of a later date suggests it is largely residual.

Ceramic Analysis

Coarse ware bowls, jars / jugs and cooking wares were predominant, but a significant number of lamp fragments and amphorae survived in the corpus as well. Noteworthy is the absence of cooking bowls. This form, which first seems to make an appearance towards the end of the 1st century AD and exists throughout the Late Roman period (mid 4th century AD), is wholly absent from the corpus. Its absence, especially in the lower strata, may suggest that the dating of the fort tends towards the early part of the 4th century, as the cooking bowl tradition is in decline.

Pottery from three major production centers, *viz.* Ayla, Petra and the Karak plateau, has been identified. As can be seen in **Table 3**, approximately one-third of the material consists of typical Ayla ware (e.g. **Fig. 21: 13**). Material that displays the characteristics of Nabataean pottery from Petra comprised the second most common ceramic ware at the site. Comparatively, pottery from the Karak plateau was minimal, yet its presence suggests that 'Ayn Gharandal participated in an extensive trade network that stretched across modern day Jordan. Finally, the unidentifiable wares were present in both diagnostic and non-diagnostic sherds.

Coarse Wares

A large variety of coarse ware bowls were discovered in 2011 (**Fig. 22: 5-9**), with the most

common being a simple rounded rim bowl with a flat base (**Fig. 22: 5-6**). Cooking pots, however, appeared in the greatest abundance. The cooking pots at the site undergo a transition from the triangular rim design (**Fig. 22: 10**) of the early 1st and 2nd centuries AD, to the grooved rim (**Fig. 22: 11-12**) of the 3rd and 4th centuries AD and, finally, to the rounded and hooked rim design of the 4th and 5th centuries AD. Jars and jugs were almost as abundant as the cooking pots. One-handed jugs, most spouted, were the most common form preserved and dated to around the mid 4th century AD (**Fig. 23: 3-4**). Large storage jar fragments were found in every square; however, diagnostic features were not preserved in many instances.

Amphorae

A significant proportion of the ceramic corpus consisted of imported amphorae. Gaza represented the majority of identifiable amphorae, with Peacock and Williams Class 48 dominating the available diagnostic sherds. However, a significant number of Egyptian (Peacock and Williams Class 52 / 53) and Ayla amphorae were present as well. Many of the preserved amphorae sherds are currently unidentifiable, by either form or place of origin, although three types previously unattested at the site were added to the variety of forms, including a Peacock and Williams Class 41 amphora, two Class 44 'Late Roman 1' sherds, and several Class 47 amphorae sherds. The data given in **Table 4** show the distribution of amphorae across the excavated squares of the site as well as the prevalence of various types of amphorae.

Fine Wares

Two important groups of fine ware come from the fort complex at 'Ayn Gharandal. The first consists of the Nabataean fine wares, which were recorded separately from the Nabataean coarse wares in order to determine their abundance. Nabataean fine wares were separated into three different categories: painted fine wares, fine wares and semi-fine wares.

Unsurprisingly, these fine wares comprised a small portion of the overall ceramic material and added little information to the dating of each locus. Only three painted fine ware sherds were recovered in 2011: a body sherd of Dekorphase

Table 4: Imported amphorae discovered during the 2011 excavations.

Area	Square	Gaza	Egypt	Ayla	Unidentified Ribbed	Other Amph.	TOTAL
Fort	C:1/7	29	4	4	2	72	111
	A:3/7	1	0	1	0	15	17
	A:6/4	6	8	10	1	3	28
	A:4/7	0	0	0	1	0	1
TOTAL		36	12	15	4	88	157

4 (2nd-3rd centuries AD) found during the survey of Area D1, a body sherd of Dekorphase 3a (20-70 AD) and a body sherd of Dekorphase 3c (100-150 AD).

A second category includes the imported wares, such as Eastern Sigilatta and African Red Slip. Three ESA sherds were identified; two were non-diagnostic body sherds and one was a closed-form ring base. Three ARS sherds were found during the 2011 excavations. A body sherd and a simple base were not identified, while the third was a Hayes Form 59 base (320-380 AD) with double circular designs as well as two rows of fan-like stamped patterns (**Fig. 21: 17**).

Additionally, *unguentaria* were uncovered in the fort but, although they were distributed across two squares, they were non-diagnostic and residual. **Table 5** below shows the number of fine ware sherds per square from the 2011 season.

Ceramic Materials from the Surface Survey of Area D1

During the 2011 season, a survey was conducted on a mound in close proximity to the fort and bath complex of the main excavation. This survey area, Area D1, presented a unique mix of ceramic material that varied from the main site.

Table 5: Fine wares from the 2011 excavations.

Area	Square	Nab. Painted Fine Ware	Nab. Fine Ware	Nab. Semi-fine Ware	Unguentaria	African Red Slip	Eastern Sigilatta A	TOTAL
D1		1	8	44	0	0	2	55
Fort	C:1/7	2	2	12	0	0	1	17
	A:3/7	0	11	8	1	0	0	20
	A:6/4	0	21	9	3	2	0	35
	A:4/7	0	6	0	0	0	0	6
TOTAL		3	48	73	4	2	3	133

The material from this survey ranged in date from the Chalcolithic and Early Bronze Age to the Early Byzantine period. These sherds were not only the earliest found at 'Ayn Gharandal, but were also the only hand-made ceramics (with the exception of a single hand-made Axumite sherd discovered in the fort). As is noted in **Table 5**, a range of fine wares was discovered in this area as well.

Conclusions

In conclusion, several observations can be made based on the 2011 material. First, there is a paucity of imported fine wares. While a few African Red Slip sherds and Eastern Sigillata sherds are present, their presence is minimal. Given the probable dating of the fort to the Late Roman period, the limited presence of Nabataean painted fine ware is understandable.

Second, the wealth of amphorae present at the site, especially Gaza amphorae, suggests that one of 'Ayn Gharandal's primary functions was trade. Unlike the 2010 season, which yielded a total of 28 amphorae, the 2011 season produced 155 amphorae sherds, with an overwhelming majority located in square C:1/7. The significance of this deposition has yet to be determined, but will be further examined as more areas of the

fort are excavated in the coming seasons.

Finally, a number of lamps and lamp fragments were excavated in 2011. Most did not yield enough surface area to be identifiable. However, several south Jordan lamps were discovered (for a comparable type from 2010, see **Fig. 21: 18**), including one in the assemblage recovered from A:6/4 (**Figs. 18, 24**). Future seasons will help shed light on the relationship between these lamps and the function of various rooms within the fort, particularly when such objects are found directly on occupation horizons.



24. South Jordan lamp from the square A: 6/4 assemblage recovered in 2011.

Preliminary Phasing of 'Ayn Gharandal based on the 2010 and 2011 Seasons

Excavation within the fort has established a preliminary phasing consistent across all three squares, though the phases in the south are lower in elevation than those in the west and north owing to the sloping topography of the alluvial deposit upon which the site was constructed. Based on preliminary ceramic readings, we hypothesize that the earliest preserved occupational strata date from the end of the 3rd century to the beginning of the 4th century and that all areas were continuously occupied through the 4th and 5th centuries with no major abandonment or destruction phases. After the 5th century the fort appears to have been abandoned, followed by successive layers of gradual collapse. At this time there is no evidence for major earthquake damage, conflagration or rebuild. There is evidence for subsequent small-scale squatters' fires as well as burials, though these produced little ceramic material and will be dated by means of radiocarbon determinations on charcoal and textiles. At present we assume these phases are considerably later than the fort's main period of occupation.

Summary and Plans for Future Excavation and Preservation

Summary

As a result of the 2010 and 2011 excavation seasons, we have not only confirmed the architectural layout of both the fort and the bathhouse, but have excavated the first stratified material from the site in the *ca.* 110 years since 'Ayn Gharandal's 'rediscovery' by western explorers to the region. The fort is a typical Late Roman *castellum* (*ca.* 40 x 40m) with four projecting corner towers. The curtain walls are lined with rooms along their interior, separated from each other by smaller partition walls. The excavated materials from the fort and bathhouse suggest a date of occupation from the late 3rd and early 4th centuries to the 5th or 6th centuries AD. Furthermore, excavated remains from the interior rooms of the fort indicate some variation in room function, with ash and domestic pottery concentrated along the north wall and amphorae along the south wall. The purpose of the rooms adjacent to the west wall is still in question. However, the presence of finely painted Greek *dipinti* suggests an official function, perhaps as a *principia* or headquarters for the garrison stationed at 'Ayn Gharandal.

We have also identified three rooms of the Late Roman bathhouse, namely the *caldarium*, *tepidarium* and *frigidarium*. From within the structure we have documented the bath's exceptionally well preserved tubulation system and plastered walls, and outside of the bathhouse we recorded the remains of the *latrina*. Additionally, excavation revealed a corpus of *graffiti*, both figural and textual, from the walls of the bathhouse. Given the type of materials used in its construction, the orientation of the bathhouse with the fort and the data collected through excavation, we can conclude that the bathhouse was likely built contemporaneously with the nearby *castellum* (Darby forthcoming).

The analysis of ceramic materials suggests that 'Ayn Gharandal was an active trading station along the 'Arabah valley, as indicated by the presence of pottery from Ayla, Petra, Gaza and the Karak plateau. This interpretation is further supported by the large number of amphorae found in the *castellum*. Conversely, the extremely small percentage of imported fine wares uncovered in 2010 and 2011 suggests that 'Ayn Gharandal inter-

acted most closely with the local and regional network of Late Roman forts / caravan way-stations and the nearby towns of *Arabia / Palaestina Tertia* rather than markets outside the province.

In sum, the data collected by the AGAP thus far implies that the fort and accompanying bathhouse were heavily used by those involved in regional trade. Evidence from the site may also suggest that the Late Roman army both policed and controlled the goods travelling between the ports at Ayla and Gaza, as well as the towns of *Palaestina Tertia*. Finally, as is the case with comparable sites in the region (Cohen and Israel 1996: 110-16; Davies and Magness 2008: 102-12; Smith 2010: 143-52), control of the water resources at 'Ayn Gharandal is further testament to the Roman army's domination of the regional trade network, which would surely have been dependent on access to the series of springs that line Wādī 'Arabah.

Future Plans

In 2013 we will continue excavations in the fort and bathhouse in order to further our understanding of both structures. Squares in the fort will be opened adjacent to those completed in the 2011 season; new squares will be excavated in one of the corner towers and in the gate. Work in the bathhouse will continue to expand on the excavations completed in 2010. In forthcoming seasons, AGAP also plans to incorporate GPR with the goal of identifying possible outlying structures to the south and west of the fort. In addition, we are planning a large conservation program for the bathhouse that may include 3D mapping of its architecture and sub-floor material, as well as wall consolidation, dependent on the needs of the DoA (Darby and Darby 2010). Ultimately, we expect that future work at the site will contribute to answering a number of larger research questions related to the Late Roman army's role in commerce, trade and natural resource management in *Arabia / Palaestina Tertia* during the 3rd and 4th centuries as well as the complex relationship between 'Ayn Gharandal's local inhabitants and its garrison.

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