

THE 2013 SEASON OF THE 'AYN GHARANDAL ARCHAEOLOGICAL PROJECT

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Overview

The site of 'Ayn Gharandal lies *ca* 70 km north of the Gulf of Aqaba, *ca* 40 km south-west of Petra and *ca* 200 m west of the mouth of Wadi Gharandal on the eastern edge of Wadi Arabah. The ruins rest alongside the modern paved road running east from the nearby Dead Sea highway. The presence of an artesian spring in the mouth of the *wadi* presumably served as the reason for human occupation at the site. 'Ayn Gharandal and its surroundings were visited by many of the early twentieth century explorers to the region (Frank 1934: 231-32; Glueck 1935: 39-40). Alois Musil was the first to record the ruins of a Roman *castellum* at 'Ayn Gharandal in 1902 (Musil 1907: 193-97). T. E. Lawrence also passed through 'Ayn Gharandal in 1914 as part of the Palestine (Wilderness of Zin) Survey (Woolley and Lawrence 1915: 14-15). 'Ayn Gharandal has been included in regional surveys in recent years (Raikes 1985: 101; King *et al.* 1989: 207; Smith *et al.* 1997: 59-60; Henry *et al.* 2001: 1-19; Gibson 2007) and pottery collected from the surface in these surveys (King *et al.* 1989: 212-13; Smith *et al.* 1997: 59-60) suggests the site was occupied from the Nabataean to Roman / Byzantine periods.

It has sometimes been claimed 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). The name also appears in the Beer Sheva Edicts as *Ariddela* (frag. V, line 5), though this may, in fact, refer to a different site altogether. Alan Walmsley has argued that Gharandal near Tafila is a more likely candidate for *Ariddela*

(Walmsley 1998: 433-41). Until the 2013 season, a total lack of any evidence from 'Ayn Gharandal confirming its identification left the ancient name of the place and the unit garrisoned there a matter of scholarly speculation.

The fort and bathhouse at 'Ayn Gharandal parallel other Late Roman sites in the region in both design and geographic location, controlling the scarce water resources along an important north - south trade route through Wadi Arabah.

The construction of the road and the numerous military installations along it, including Bersabee, Chermela, Thamara ('En Hazeva), Zoara and Arieldela (Gharandal), are attributed in the *Onomasticon* of Eusebius to the transfer of the *Legio X Fretensis* from Jerusalem to Aila at the beginning of the fourth century BC (*On.* 11, 42, 50, 118, 129; Erickson-Gini 2007: 91; Millar 1996: 188). In a broader historical context, the Roman military presence at 'Ayn Gharandal during Late Antiquity appears directly related to the reorganization and redeployment of the legions of *Arabia* and *Palaestina* to the eastern frontier under Diocletian and the Tetrarchs in *ca* 300 BC (Parker 2006: 541-62; Erickson-Gini 2007: 98; Kennedy and Falahat 2009: 150-69).

Research Agenda and Summary of Previous Work

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 Wadi Arabah. The long term project goals are to: investigate the occupational

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

From the data collected during an initial survey in 2009 (Darby, Darby and Shelton 2010; Darby and Darby 2010), five specific squares from three quadrants were selected for the initial season of excavations in 2010. Three are associated with the remains of the *castellum* (A:6/4; A:3/7; C:1/7), while two lie in the ruins of the bath complex (D:6/12; D:6/13). Work in the area of the bath revealed the *caldarium*, *tepidarium*, part of the *frigidarium* and a latrine, as well as numerous graffiti adorning the walls of the bathhouse and in the surrounding debris (Darby and Darby 2012). In 2011, excavation continued in three squares in the fort (A:6/4; A:3/7; C:1/7), which yielded a wide variety of material cultural remains, including rooms along the north, west and south walls of the fort and a painted inscription currently under analysis at the American Center of Oriental Research in Amman. The inscription includes a narrative about the Roman army and a list of names, including those of Nabataean descent. Excavation of a small probe (B:2/1) along the fort's east curtain wall revealed the location of the fort's gate (Darby and Darby 2012)¹.

The 2013 Season

The primary goals of the 2013 'Ayn Gharandal Archaeological Project were as follows:

- Expand the 5 x 5 m probes excavated in 2011

- along the north and west curtain walls of the fort;
- Expand the two 1 x 1 m probes excavated in 2011 along the east curtain wall of the fort;
- Excavate a new 5 x 5 m probe on the site's eastern ridge;
- Collect, record, conserve and publish all excavated materials on behalf of the Jordanian Department of Antiquities;
- Continue our architectural and topographical mapping of the site, including the use of ground penetrating radar;
- Preserve the remains at the site by backfilling all of the excavated areas at the conclusion of our work;
- Continue developing a long-term conservation /preservation plan for the site, as well as its potential as a tourist destination in relation to the ongoing development of Wadi Arabah and the Red - Dead canal project;
- Prepare the results of the project for publication in *ADAJ* and other academic journals.

Personnel

Field staff for the 2013 season included Dr Robert Darby (University of Tennessee) and Dr Erin Darby (University of Tennessee), the project co-directors, and Fawwaz Ishakat (Hashemite University), the surveyor. The field director for the fort was Dr Carrie Duncan (University of Missouri - Columbia) and she directed excavation in square B:2-1/1-1. Craig Harvey (University of Victoria) was the square supervisor for A:6-5/4-3 in the fort. Russell Gentry (North Carolina State University) oversaw excavation in A:4-3/7-6 in the fort. Jessica Walker (University of Pittsburgh) directed excavations on the eastern ridge in square D:20/59. Other field workers included 16 *bedouin* as well as 12 students from the University of Tennessee, three students from the University of Missouri - Columbia, two

1. The AGAP would like to thank the following institutions and persons for their continued support: the Department of Antiquities of Jordan, the American Center of Oriental Research, the ACOR Conservation Cooperative, the American Schools of Oriental Research, the University of Tennessee, the University of Missouri - Columbia, Dr Barbara

Porter (Director of ACOR), Dr Christopher Tuttle (Associate Director of ACOR), Dr S. Thomas Parker (North Carolina State University), Dr John Oleson (University of Victoria), Fatma Marii (Jordan Museum), Brittany Dolph of the Cotsen Institute, and Jihad Haroun, Rula Qussous, Ahmed Lash and Khalil Hamdan of the Department of Antiquities of Jordan.

students from North Carolina State University and three volunteers from North America.

Dr Erin Darby directed the archaeological lab in Aqaba and registered the artifacts, Tiffany Key and Pamela Koulianos (North Carolina State University) performed the field readings for the ceramic materials, Cassandra Brigham (Carleton College) assisted with GPS and geoarchaeological analysis, and Anna Hendrick (North Carolina State University) completed the pottery, artifact and architectural drawings. In addition, Dr Nathan Elkins (Baylor University) analyzed the coins from the 2011 season, Dr Austin Hill (Smithsonian Institute) analyzed the faunal remains and conducted a low-flying aerial photographic survey of the site, and Dr Tina Niemi (University of Missouri - Kansas City) conducted ground penetrating radar and geoarchaeological analysis. Following the field season, material culture from the 2013 season underwent conservation at the American Center of Oriental Research in Amman. Conservators included Dr Fatma Marii (Jordan Museum), Naif Zaban (American Center of Oriental Research Conservation Cooperative) and Brittany Dolph ('Ayn Gharandal / ACOR conservation intern from the UCLA / Getty program in archaeological and ethnographic conservation).

Methods and Objectives

Three squares from the Late Roman fort (A:6-5/4-3; A:4-3/7-6; B:2-1/1-1) and one square from the eastern ridge (D:20/59) were the focus of the 2013 season. The three squares in the fort are associated with the remains of a ca 40 x 40 m Roman *quadriburgium*. These areas were chosen based upon the understanding of the squares from the 2011 excavation season, their potential for revealing important information about the construction, use and function of the architecture contained within each square, and the nature and depths of the stratigraphic deposits at the site. The square on the eastern ridge was chosen based on two criteria: preservation against consistent looting observed since 2010 and the possibility of occupation levels

that predate the fort's period of occupation.

Preliminary Stratigraphic Report

Square B:2-1/1-1

Square B:2-1/1-1 was opened in the 2013 season to explore the main gate of the fort. Probes conducted by Robert Darby along the east curtain wall during the 2011 season revealed the location of the gate; the 2013 excavation area expanded upon this discovery by laying out a 5 m (east - west) x 10 m (north - south) excavation area. The area is bounded by the east curtain wall along its west side and spans the entryway of the gate where it cuts the curtain wall. The square was excavated under the direction of Carrie Duncan (University of Missouri) with the assistance of Emily Sussman (North Carolina State University), five students / volunteers, and *bedouin* workers. The primary goal for this excavation area was to ascertain the manner of the gate's construction, use and collapse.

Excavation of B:2-1/1-1 immediately revealed inhumations outside of the fort's east curtain wall. As with the other burials recorded in 2010 and 2011 (Darby and Darby 2012), the bodies were located in shallow cist graves and were facing south suggesting burial sometime during the Islamic period. Below the level of the secondary graves, excavation produced a layer of collapse containing both building stones from the fort's gate, as well as the remains from the fort's mudbrick superstructure. In addition to large wall stones, the layer of collapse included the gate's arch, fallen almost directly forward from the entrance (**Fig. 1**).

Above the collapsed arch a large limestone block, ca 0.9 m x 0.65 m x 0.25 m in size and 343 kg in weight, was found lying face-down in the sand. After excavating all of the collapsed mudbrick and arch stones, the block was raised. It was inscribed with a dedication to Diocletian and the Tetrarchs, securely dating the foundation of the fort to the end of the third or beginning of the fourth century BC. The inscription also provided the name of the Roman governor in the province and the name of the garrison: the *Cohors II Galatarum* (see below).



1. Gate collapse with arch and inscription stones in Square B:2-1/1-I, looking west. Courtesy of the 'Ayn Gharandal Archaeological Project.

Underneath this collapse layer, excavation revealed a layer of sand. This pattern seems to indicate that the fort was abandoned prior to the collapse of its gate and superstructure. Only under the sand layer did excavation detect significant occupational debris. In fact, the occupation horizon was associated, not with the primary phase of gate construction, but with a secondary construction phase consisting of two stone walls narrowing the mouth of the gate, a secondary threshold stone in the remaining opening and an earthen ramp that led from the higher elevation in the gate to the lower ground outside the fort to its east. This phase produced a number of whole vessels dating to the fourth century BC. Underlying this secondary construction phase is the primary threshold of the fort. Further excavation of this area will be undertaken in the 2015 field season (**Fig. 2**).

Special Find: the 'Ayn Gharandal Inscription

The foundation inscription was preserved in exceptional condition. Because it fell face-down in the sand, not only was the majority of the text legible, but much of the red paint was still adhering to the stone. The inscription is set within a carved frame, or *tabula ansata*, also containing decorative reliefs of palm branches and a circular boss. It lists the names of the two *augusti* and two

caesares to whom the inscription is dedicated: Diocletian, Maximian, Galerius and Constantius I. Thus, the monumental inscription not only provides a date for the foundation of the fort at 'Ayn Gharandal during the reign of the Tetrarchy (293 - 305 BC), but also provides a *terminus post quem* for all subsequent occupation at the site.

In addition, the inscription confirms the site's name in antiquity. It has been claimed that the modern Arabic name 'Gharandal' derives from *Arieldela*, listed in the *Notitia Dignitatum* (*Or.* 34.44) as the location of the *Cohors II Galatarum*, a Roman auxiliary infantry unit. The 'Ayn Gharandal inscription indicates that the site was the location of the *Cohors II Galatarum*, confirming its ancient name, *Arieldela*. The inscription also includes the name, Priscus, the regional governor of *Syria Palaestina* at the time of the fort's foundation. Finally, the inscription includes a *damnatio memoriae*, erasing the name of Maximian. The name of the province was also erased, presumably owing to the changes in provincial structure subsequent to Diocletian.

The 'Ayn Gharandal inscription is one of the most important sources of data for the build-up of Rome's defenses in Late Antiquity, along with inscribed milestones and a small number of other building inscriptions. In fact, only four epigraphic examples from the entirety of the



2. Fort gate with secondary walls and threshold in Square B:2-1/1-1, looking west. Courtesy of the 'Ayn Gharandal Archaeological Project.

Roman provinces of *Arabia* and *Syria Palaestina* can be associated with the construction of a Tetrarchic-era fortification. These include building inscriptions from the *castella* at Dayr al-Kahf (305 / 306 BC; fragmentary, now lost), Qasr Bshir (293 - 305 BC; *in situ* above gate), Ghadian / Yotvata (ancient Costia / Osia 293 - 305 BC; found lying in front of gate, now in the Israel Museum) and the legionary camp at Udhruh (ancient Adrou 293 - 303 BC; found lying in front of gate, now broken).

Unlike comparable inscriptions at Ghadian / Yotvata and Udhruh, which were not found during stratigraphic excavation, the 'Ayn Gharandal inscription was preserved *in situ* among gate collapse. The significance of the archaeological context should not be underestimated, particularly for dating the fort's foundation. Preliminary analysis of the site's coins and ceramics indicate that the majority of datable materials from the occupation horizon come from the middle of the fourth century or the fourth century more broadly, rather than the end of the third - beginning of the fourth century as might be expected with a Diocletianic foundation. Moreover, beyond the inscription stone, excavation has yielded few datable materials from the fort's initial construction

phase, especially given the elusive nature of the fort's foundation trenches and the absence of datable materials beneath the lowest floors and stone wall socles.

To date, the only other evidence for a Tetrarchic foundation remains the date of the mudbrick collapse near the top of the excavation trenches; preliminary analysis dates these loci to the late third - early fourth centuries BC even though they overlie compressed sand that dates to slightly later in the fourth century. In sum, with the exception of the mudbrick collapse layers, which remain susceptible to post-occupational processes, only the inscription stone found through stratigraphic excavation above the collapsed arch provides definitive evidence for the foundation period and historical context.

Not only is it rare for an inscription to survive antiquity, it is fortunate that the inscription was not disturbed in the modern period. The documented history of looting and construction damage at 'Ayn Gharandal (Darby, Darby and Shelton 2010; Darby and Darby 2013) demonstrates the important role excavation plays in preserving cultural heritage. Owing to the efforts of AGAP, the American Center of Oriental Research and the Jordanian Department of Antiquities, the inscription can

now be analyzed in both its architectural and archaeological contexts and displayed for future generations.

Square A:4-3/7-6

Square A:4-3/7-6 was an expansion of previous work in A:3/7 and A:4/7. In 2010, Carrie Duncan excavated A:3/7 along the western curtain wall. Progress was slowed by the presence of a burial and, after the removal of this burial, work resumed in 2011 under the direction of Abigail Turner. At that time A:3/7 was excavated to bedrock, revealing the internal face of the west curtain wall and collapsed painted plaster with dedicatory *dipinti*. Additionally, a small portion of A:4/7, just to the north of A:3/7, was excavated to remove a burial that was located in both squares.

For the 2013 season, square A:4-3/7-6 combined A:3/7 and A:4/7 and was expanded to the east to include A:3/6 and A:4/6, thereby totaling 10 x 10 m. Thus, excavating A:4-3/7-6 included both the removal of backfill from A:3/7 as well as new excavations in the other three quadrants of the square. With the identification of the fort's gate in the center of the eastern wall, and the recovery of official documentation set inside a tabula ansata painted on plaster recovered from A:3/7, it is almost certain that the facilities in A:4-3/7-6 constituted the principia of the fort; the definition and excavation of this room was the primary objective of the work in A:4-3/7-6.

The team of excavators included the trench supervisor, Russell Gentry (North Carolina State University) and assistant trench supervisor, Hilarie Zombek (University of Tennessee), as well as five other field school students and a staff of *four bedouin* with additional support as needed.

As in the other squares of the fort, once the top layer of wind-blown sand was removed, excavation produced thick layers of mudbrick collapse as well as secondary cist graves, particularly in the northern half of the square. Of the *ca* 14 separate burials from this trench in the 2013 season (physical analyses are ongoing), at least 12 were located in the northern half. Burials

from the square included both children and adults and produced a small number of material culture remains, including fragments of burial shrouds, a shell and a bronze ring. As a result, excavation proceeded very slowly in the north of A:4-3/7-6. This half of the square was closed after the third week of the season to finalize the burials visible at that time and to prevent the likely possibility of opening new, deeper burials with little time remaining to excavate them properly.

In the southern half of the square, excavation confirmed the contours of a large room bordered by the curtain wall in the west, two mudbrick partition walls on the north and south, and a stone wall demarcating the courtyard to the east. As in the other fort squares, a layer of sand was underlying the mudbrick collapse. In the process of excavating the compressed sand, a conglomeration of stones and fallen plaster became visible, though, in contrast with the 2011 season, none of the plaster contained any trace of painted *dipinti*. The stones proved to be the remains of two large piers that had collapsed across the room in antiquity (**Fig. 3**). The piers very likely supported a raised ceiling. In addition, the east wall separating the room from the fort's central courtyard included large stones similar to those used in the fort's gate. When taken in combination with the plaster *dipinti* from 2011, these unique architectural features seem to further reinforce the hypothesis that this room served as the fort's *principia*.

Given the number of burials and the extensive stone collapse, excavation did not reach bedrock in A:4-3/7-6 during the 2013 season. While the north half of the square will remain closed until future seasons, the southern room will be finalized during a short excavation season in 2014.

Square A: 6-5/4-3

Square A: 6-5/4-3 is located on the fort's northern curtain wall. It was laid out with a north - south orientation and measures 10 m x 10 m. Square A: 6-5/4-3 is an amalgamation of four squares: A:6/4, A:6/3, A:5/4 and A:5/3.



3. Principia of the fort, along the west curtain wall, with the remains of two large piers in Square A:4-3/7-6. Courtesy of the 'Ayn Gharandal Archaeological Project.

The 2013 season marks the third time this area has been opened for excavation. In 2010, limited excavation was carried out in Square A:6/4 by Byron McCane (Wofford College). This excavation did not reach occupation levels but did identify a mudbrick partition wall and located an arch collapse. In 2011, excavation under the supervision of Craig Harvey clarified the south face of the curtain wall and reached occupation in two adjacent rooms. The 2011 season also shed more light on the internal architecture of the rooms, which had an ashlar arch each. Additionally, the artefacts from the occupations levels suggested that these rooms had a domestic function.

In order to gain further insight into the layout and function of these rooms, it was decided to return to this area and expand the square to the east and south. It was hoped that this expanded square (A:6-5/4-3) would be able to catch another partition wall to the east and the southern cross wall, thereby providing the full dimensions of these rooms. Other goals for the 2013 season were to gain a better understanding about domestic life within the fort, to clarify exactly how these rooms were used, and to provide clues on when and for how long the fort was occupied. The square was excavated under the direction of Craig Harvey (University of

Victoria), with the assistance of Jordan Karlis (North Carolina State University), six students / volunteers, and *bedouin* workers.

Excavation in all three rooms yielded mudbrick collapse underneath the surface layers of wind-blown sand. In the center room, an ash layer and two walls were exposed underneath the mudbrick collapse, though no datable materials were associated with these loci. In the western and eastern rooms the mudbrick layers continued even deeper and overlaid a firm sand layer. The same firm sand layer was detected below the secondary walls in the middle room as well. Only underneath the sand layers did the main occupation debris appear. In the eastern room this included a *tabun* and an associated beaten earth floor. It is currently hypothesized that this *tabun* and floor represent a secondary construction phase during the fourth century BC and may be coterminous with the secondary construction phase observed in the fort's gate (**Fig. 4**).

Beneath the *tabun* in the eastern room was a circular feature containing two fill layers. This feature and two partially-preserved floors in the eastern and middle rooms seem to belong to the same phase, possibly the primary construction phase of the fort. The cobble floor was uncovered in the south of the eastern room and the flagstone floor was uncovered



4. Secondary tabun in room along north curtain wall of fort in Square A:6-5/4-3. Courtesy of the 'Ayn Gharandal Archaeological Project.

in the northern part of the middle room. A brown soil layer with limestone flecks and rich material cultural remains was observed filling the circular feature and overlying these floor surfaces. Preliminary ceramic analysis dates these brown soil layers to the fourth century BC.

Although a portion of the western room had already been excavated in 2011, excavation in 2013 revealed another feature. Underlying the brown soil with lime that appears in all three rooms, excavation uncovered the remains of a basin filled with similar brown soil. This feature was detected at the lowest elevation in A:6-5/4-3 and preliminary ceramic analysis dates the fill inside to the late third - early fourth century BC. If this is correct, the basin fill would be the earliest locus uncovered in 2013. Alternately, if the brown soil inside the basin is joined with brown soil locus above, then the date would be raised to the middle of the fourth century; thus the date of the basin's fill must remain in doubt.

Excavation of these three rooms also proves that the arches observed in 2010 and 2011 appear to extend across the fort's northern curtain wall. Thus far, no other rooms along the west or south curtain walls have produced similar arches. It is currently presumed that the arches supported a second story along the north wall (**Fig. 5**). As in previous seasons, the rooms along the north

curtain wall also produced the best evidence for domestic activity including cooking installations, domestic pottery and animal bones. These rooms also yielded a great number of coins and a bronze make-up applicator.

Square D:20/59

Excavation within square D:20/59 on the east ridge overlooking the main site was initially undertaken in an effort to document and conserve a possible monumental tomb structure. A ceramic surface collection in 2011 observed a partially exposed cist cut, the remains of stone walls and the presence of scattered human remains uncovered by looting. In response, excavations in 2013 aimed to understand the structure's function and record the data from the remaining intact portions of the feature. A single 5 m x 5 m square (D:20/59) captured portions of all the visible architectural features of interest for initial conservation efforts within the area designated as the 'East Ridge' (previously referred to as Area D1 in Darby and Darby 2012). Excavations were directed by Jessica Walker (University of Pittsburgh), with the assistance of Daniel Tallent (University of Missouri - Columbia), two students / volunteers, and *bedouin* workers.

Continued and extensive disturbance was evident at the surface by the presence of



5. Rooms with arches along the north curtain wall of the fort in Square A:6-5/4-3. Courtesy of the 'Ayn Gharandal Archaeological Project.

looting trenches exposing portions of walls, a cut stone threshold and a stone door post. All evidence of disturbance was documented with photographs prior to excavation. As in other areas of the site, the east ridge contained inhumations. Two intact burials, three disturbed burials and isolated human remains were uncovered in several disturbed areas, providing evidence for an Islamic period use.

Excavation revealed the interior spaces of two rooms which may or may not belong to the same structure. The data available to interpret the function of these rooms was limited by the extensive looting and continual modification of the area. Neither appears to be a tomb (as was originally hypothesized). The area may have served as a watch tower. While the view to the north is relatively poor, the position atop the ridge affords favorable views to the west and south-west overlooking Wadi 'Arabah and east toward the spring. Additional walls appear to have extended to the west, although, given the extensive looting and mixed ceramic material, this must remain conjectural. Based on the excavated data, it could not be determined whether this was an indoor or outdoor space. It is possible that the rooms on the east ridge were utilized prior to construction of the fort, possibly during the life of the fort, and / or following

abandonment of the fort. They were certainly used throughout the modern period (Fig. 6).

Summary Assessment For Future Excavation

Having accomplished the 2013 'Ayn Gharandal Archaeological Project field goals, AGAP is now in a considerably better position to pursue excavation in upcoming seasons. In the fort, the 2013 season broadened the excavation areas and, in so doing, reached bedrock in two full rooms and part of a third room along the north curtain wall. These rooms produced a large amount of material cultural remains, including evidence for secondary construction phases. The project also succeeded in excavating the collapse of the fort's gate and retrieving the monumental foundation inscription *in situ*. Furthermore, the 2013 season clarified the architectural features of the presumed *principia*, along the west curtain wall, including all four of the room's walls, and retrieved evidence of monumental construction in the room's east wall and the remains of large piers that would have supported a raised ceiling.

Excavation in 2013 also generated a large amount of information about the site's multiple secondary burials. AGAP uncovered burials from all areas of the fort, particularly along the western curtain wall, and on the eastern ridge. The orientation of the human remains in 2013



6. Remains of rooms on the eastern ridge in Square D:20/59. Courtesy of the 'Ayn Gharandal Archaeological Project.

and previous seasons indicate the individuals were probably Muslim. The elevation of the cists *ca* 1m below the modern surface and the absence of any modern memory of a cemetery by the local bedouin population suggest the bodies may have been interred during the Islamic period. Thorough excavation of the burials has produced an array of cloth and charcoal for C14 analysis, which might help confirm the period to which these individuals belong.

On the eastern ridge, AGAP retrieved the remaining data from the structure overlooking the *wadi*, despite its looted state. Excavation revealed that, contrary to early hypotheses, this structure was not a Nabataean tomb, though it may have served some purpose, perhaps as a watch tower. Owing to extensive modern disturbances and mixed pottery, the date of these rooms must remain in question. At best, surface sherds collected in 2011 from this area contained the earliest material uncovered at 'Ayn Gharandal as well as a number of examples of Nabataean fine ware (Darby and Darby forthcoming). Based on the surface collection, it remains possible that the rooms predated the fort, but looting has all but eradicated any such evidence from excavated contexts. At the same time, tooling marks on the cut stones offer little chronological assistance and resemble hammer

dressed stones used in the secondary phase of the gate and at other Late Roman sites in the region.

Excavation in 2013 has also confirmed some aspects of the AGAP preliminary phasing in the fort. Based on preliminary ceramic readings in 2011, it was hypothesized that the earliest occupation dates to the end of the third century or the beginning of the fourth century BC. Some loci from the 2013 season seem to confirm this hypothesis. Most significantly, the newly uncovered inscription indicates that the fort was founded at that time, as part of the Diocletianic military build-up in the region.

In addition, the 2013 field season has provided greater clarity about secondary construction phases in the fort, at least in the gate and in one room along the northern curtain wall. Pottery from these loci suggest that both construction phases date roughly to the fourth century BC, with a greater preponderance of pottery and coins dating to the end of occupation. It is not yet clear whether the secondary construction phases were limited in scope to the fort's northern wall and the modified gate. It is possible that excavation areas in 2011 along the fort's southern wall were simply too small to detect secondary phasing. Still, there is no comparable evidence for secondary phases in the presumed *principia*, even though excavation

reached as low as *ca* 0.7m above the floor of the room. Ultimately, only further excavation will rule out secondary phases in that area.

Finally, the 2013 field season has produced new questions about the end of occupation at the site. The season provided the first secure evidence for earthquake damage at 'Ayn Gharandal. Large-scale collapse in the gate and along the northern and western walls suggests one cataclysmic destruction event; the 363 BC earthquake would be a logical explanation, though the ceramic evidence for dating is still preliminary.

That having been said, the earthquake appears to post-date the end of occupation. Stratigraphy in all areas of the fort during 2011 and 2013 suggest the fort was abandoned before any earthquake damage, as indicated by the layers of compressed sand separating the collapsed mudbrick above the sand from the occupation debris below. The sand layers, which largely date to the mid- to late fourth century, suggest the fort stood abandoned prior to the mudbrick collapse brought about by the presumed seismic event. This suggests the 363 earthquake (if that is the correct date) may not account for the end of occupation at the site. Rather, the end of occupation must be attributed to other, yet undetermined, factors.

It is possible that environmental factors may have played a role in the fort's abandonment. The data from nearby Wadi Faynan have indicated the presence of possible environmental shifts taking place between Nabataean and Roman occupation, including a pattern of 'humanly induced desertification' (Barker 2000, 2002). Niemi and Smith (1999) have also hypothesized that a climate shift affected Wadi 'Arabah preceding and following the Roman period. Although these hypotheses are preliminary, they suggest the possibility that natural climate change, land-management strategies or a combination thereof were at least partially responsible for the end of occupation in the fourth century.

It is thus also possible that the secondary construction modifications in the 'Ayn Gharandal gate occurred in response to negative anthropogenic effects or

changing environmental conditions, as an attempt to protect the fort from sand accumulation or changing run-off patterns from Wadi Gharandal. Likewise, it is possible that environmental changes played a role in the fort's abandonment. Whatever its cause, the stratigraphy uncovered in the fort during the 2013 season has opened up new questions for further research that will figure prominently in future AGAP seasons.

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