NEW EXCAVATIONS OF THE CITY WALL AT ISLAMIC AYLA IN 'AQABA, JORDAN

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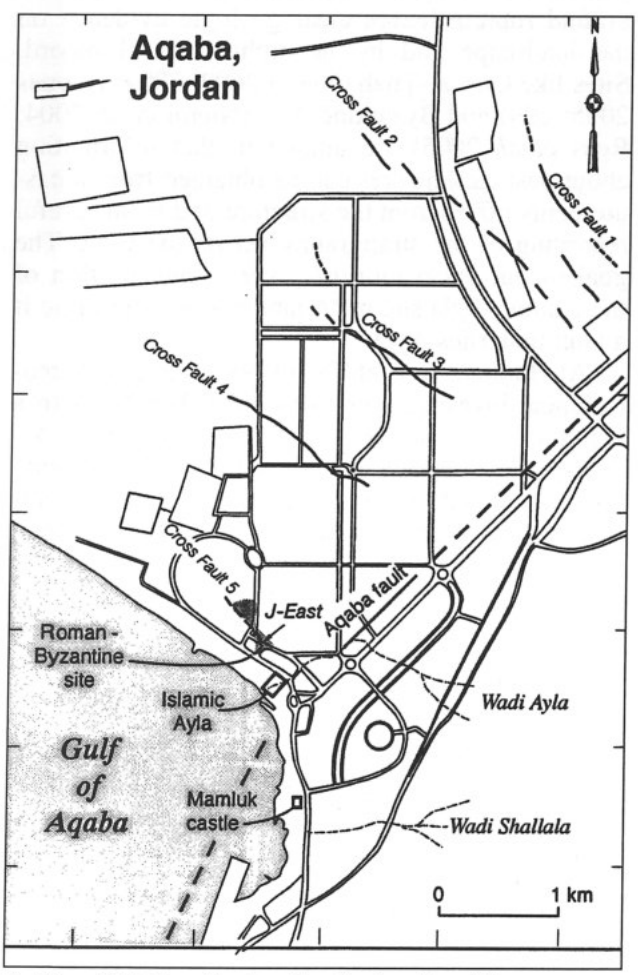
Introduction

The Early Islamic site of Ayla, extensively excavated by Donald Whitcomb of the Oriental Institute at the University of Chicago, is a walled city, ca. 250m southeast of the Byzantine city wall excavated by Parker (Parker 1996), and approximately 850m north of the Mamluk castle in modern 'Aqaba (**Fig. 1**). The city of Islamic Ayla was probably founded under the Caliph 'Uthmān bin 'Affān around 650AD (Whitcomb 1995: 277).



1. Map of Modern 'Aqaba, showing location of three occupational periods and known faulting (Slater and Niemi 2003).

The city seems to have suffered some damage as a result of the 748AD earthquake, and extensive reconstruction with the beginning of the Abbasid period (Whitcomb 1994: 9). It is described by al-Maqdisī in the late 10th century, as he described it in reference to the ruins nearby of the Roman/ Byzantine site (after Whitcomb 1997: 359). The town was severely damaged by the earthquake in 1068AD (Ambraseys 1994: 31). The destruction and loss of life (accounts claim that all but 12 residents who had been out fishing were killed) caused by this earthquake may account for the relative ease with which Baldwin I of Jerusalem took over when he arrived with a small retinue in 1116AD. Baldwin I constructed a small fortification (the origin of the current castle?), and a new settlement grew up around this (Whitcomb 1997: 359). The site of Islamic Ayla was apparently never reoccupied to any significant degree after the time of the Crusaders.

Based both on the historical accounts and the archaeological work of Whitcomb and Parker, it is clear that earthquakes have played a significant role in the history of the 'Aqaba region. It is also clear that given the location of 'Aqaba on the Dead Sea Transform, where a major NE-trending strike-slip fault (the 'Aqaba fault) that originating in the Gulf of 'Aqaba terminates under the modern city, earthquakes will continue to be a major factor in the region in the future. Geological trenches excavated across several faults in 'Aqaba document that the fault motion is transferred from the 'Aqaba fault onto five northwest — trending cross — faults that produce active tectonic subsidence at the head of the Gulf (Niemi and Smith 1999; Mansoor 2002: 258; Slater and Niemi 2003). The exact location of the 'Aqaba fault is uncertain due to urbanization of the region, although Whitcomb has hypothesized that the wadi running across the site of Ayla has its origins in erosion along the structural weakness of the fault itself. Thus, our main objective in investigating the city wall of Ayla was to test this hypothesis and attempt to locate the 'Aqaba fault.

Previous Scholarship

As mentioned above, Ayla was extensively excavated by Whitcomb between 1986 and 1995. Among his many conclusions were some relating to the earthquake history of the site. The most significant of these was his hypothesis that the wadi running roughly NE-SW through the site originated along the line of a major fault (Whitcomb 1993: 19). Our excavations in 2001 and 2003 were specifically designed to test that hypothesis. Whitcomb had previously demonstrated that architecture and other cultural remains were still present in the wadi itself during his excavations in 1993 and 1995. In 2000, Parker, as part of his Roman 'Aqaba Project, excavated a trench (R1) across the alignment of the city wall, in the wadi underneath the bridge carrying the Corniche Road (al-Istiqlāl Street) across the wadi (Parker 2002: 421). This trench was designed to reach the foundations of the wall, and lay to rest persistent questions about the possibility of the site's origin as the legionary fort of the *Legio X Fretensis*. In fact, the trench revealed a section of the wall, in good condition, and revealing no apparent earthquake damage. Parker's work has finally answered this question with pottery from the foundations and below indicating a firm seventh century date for the construction of the city wall at Ayla (Parker 2002: 421). With this history of the previous work in the wadi in mind, it was clear that it should be possible to trace the alignment of the city wall across the entire width of the wadi, thus revealing any misalignment caused by fault slip, as well as any other earthquake damage. This effort was somewhat complicated by the projected location of the corner tower, which should have been, and was, near the center of the wadi. In 2001, a brief sounding (R2) as part of the Wādī 'Araba Earthquake Project revealed the inner alignment of the wall between the R1 trench and the projection of the alignment of the wall to the NW located by Whitcomb. In 2003, we opened three trenches, one (R3) over the projected (and actual) location of the corner tower, the other two (R4 and R5) across the alignment of the wall running SE from the corner tower.

It is worth noting as well that while they never excavated at the site, Galli and Galadini (2001) also proposed an alternate map of the potential line of a fault based largely on unpublished information from Whitcomb's excavation and survey of 1996. They hypothesize a fault running NNE-SSW from the Sea Gate to the reconstructed wall NW of the Egyptian Gate with associated sinistral wrenching of exposed walls (Galli and Galadini 2001: 295). Our observations and survey suggests that there is little evidence of misalignment of the original walls that would support their proposed location of the fault.

Goals

The overall goals of the Wādī 'Araba Earthquake Project are to excavate across locations where previous investigators had documented or proposed that earthquake faults cut across ancient structures in order to understand both the chronology and magnitude of ancient earthquakes. The purposes of this project are to identify primary evidence for ground-rupturing faulting events caused by earthquakes and to document the associated collapse, damage, and repair of the architecture in antiquity. Earthquakes are one of many catalysts for social, political, and cultural change that may have affected a region in antiquity, and it is therefore important to study both the occurrence and severity of these events in history.

Because earthquakes are generated by sudden slip or motion on a fault, the ground will generally "rupture", or crack, along the fault in earthquakes greater than Richter magnitude 6.5. This type of ground rupture leaves clear geologic evidence on the landscape and in the archaeological record. Sites like Qaṣr aṭ-Ṭilāḥ (Niemi 2002, 2004; Haynes 2005: 209) and Byzantine Aila (Niemi *et al.* 2004; Ross *et al.* 2005) are unique in that information about past earthquakes can be obtained from measurements offset from the structure and from careful recording of the stratigraphy across the fault. The goal of our excavation of a very small portion of the Islamic Ayla site in 'Aqaba was to determine if a fault underlies Ayla.

Al-Hamoud and at-Tal (1998) conducted geotechnical investigations using three boreholes to a depth of 12m on the tall of Islamic Ayla. Archaeological deposits overlie sand and fluvial gravels. They noted tilting and sinking of exterior walls that they interpreted as slumping due to horizontal ground acceleration in an earthquake. The NW corner is underlain by 5m of sand below the water table, based on a borehole outside the Egyptian gate towers. According to the analyses of Mansoor and others (2004), Ayla lies in an area of high liquefaction susceptibility, due to the presence of saturated sands at shallow depth. This means that in situations of earthquake shaking, the substrate may lose its ability to bear weight, resulting in collapse of structures. Areas in the city of 'Aqaba that experienced subsidence in the Nuwaybi' earthquake of 1995 lie along the beach zone near the ancient site of Ayla (Wust 1997; Malkawi *et al.* 1999).

The specific goal of our excavations in these two seasons was to test the hypothesis proposed by

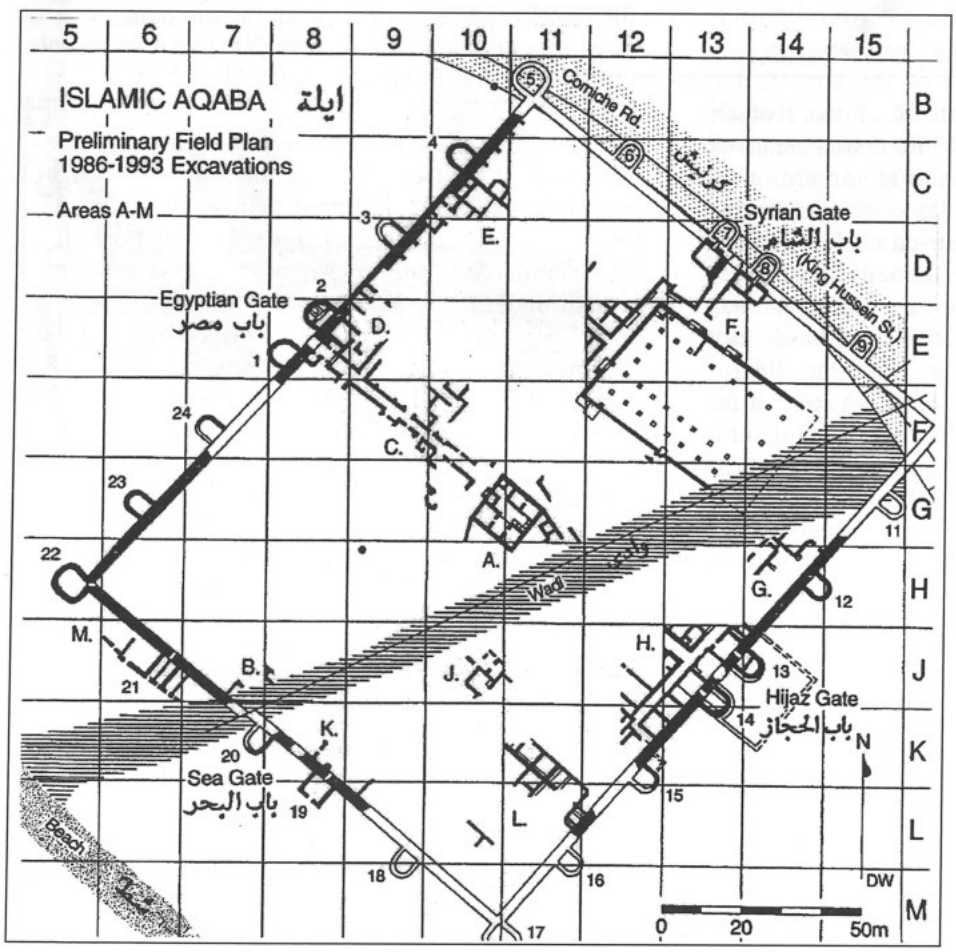
Whitcomb (1993) that the wadi, which currently cuts through the site of Islamic Ayla, was created by a seismic fault. He hypothesized this based on an approximately 2m misalignment he projected across the wadi in the Sea Wall of Islamic Ayla. Whitcomb himself never excavated in the area under the modern al-Istiqlāl Street bridge, but projected the corner of the city wall, based on its alignments leading into the corner (in which no ancient remains were visible on the surface) (**Fig. 2A**).

In 2000, as a part of his Roman 'Aqaba Project, Dr. Thomas Parker opened a trench (RAP 2000 R.1) across the projected alignment of the NE city wall under the bridge in an effort to date the foundations of the city wall. The choice of location for this trench was mandated by an effort to minimize the amount of more recent cultural overburden. Excavation to below the foundation during that season proved, based on pottery evidence, that the city wall of Islamic Ayla was founded at the very beginning of the Umayyad period, ca. 650 (Parker 2001). Serendipitously, this trench also considerably lengthened the known alignment of the city wall, and throughout this section, there is no significant offset or structural damage.

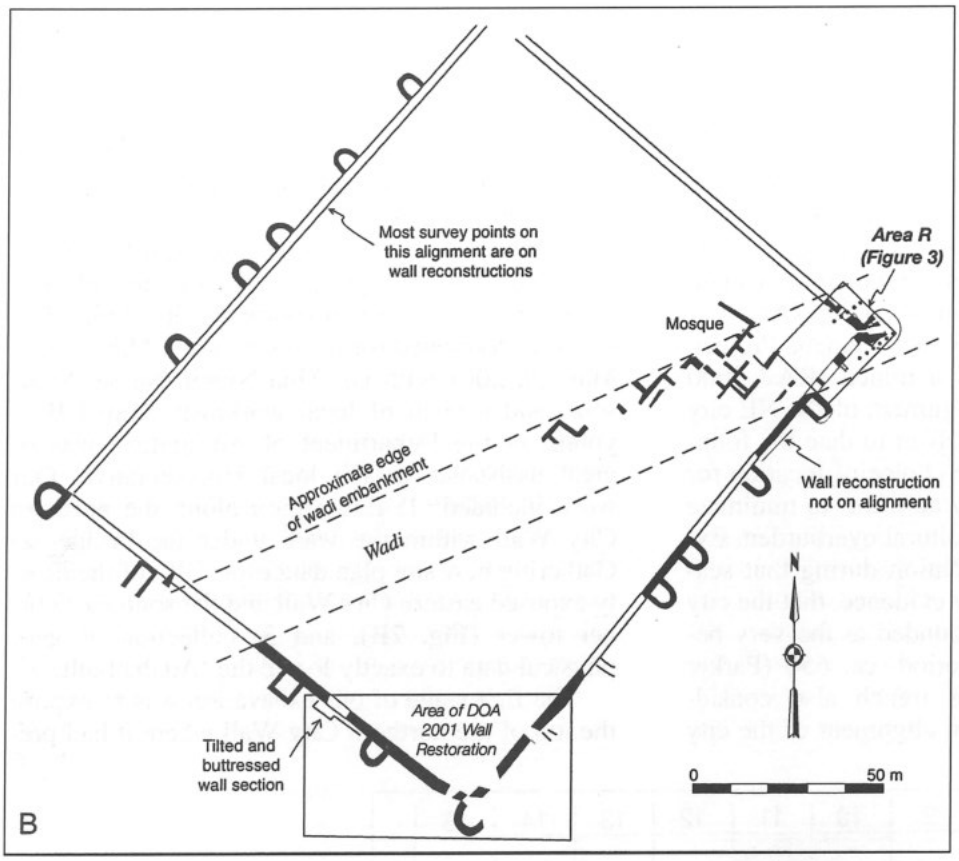
Excavation

In 2001, the main objective of our work within Islamic Ayla was to verify the location of the fault. The work at Islamic Ayla was done to assist Ms. Sawsan Fakhri, director of the 'Aqaba office of the Department of Antiquities, who was actively excavating the eastern and southern City Walls. Excavation continued for 6 days between May 14 and May 19, 2001 with Dr. Tina Niemi, Nasser Mansoor, and a team of local workmen. Manal Basyouni, of the Department of Antiquities, was of great assistance as the local representative. Our work included: 1) Excavation along the northern City Wall within the wadi under the bridge; 2) Gathering new site plan data especially of the newly exposed eastern City Wall and the southeast corner tower (**Fig. 2B**), and 3) collection of geophysical data to exactly locate the 'Aqaba fault.

The first stage of our excavation was to expose the top of the northern City Wall where it had pre-



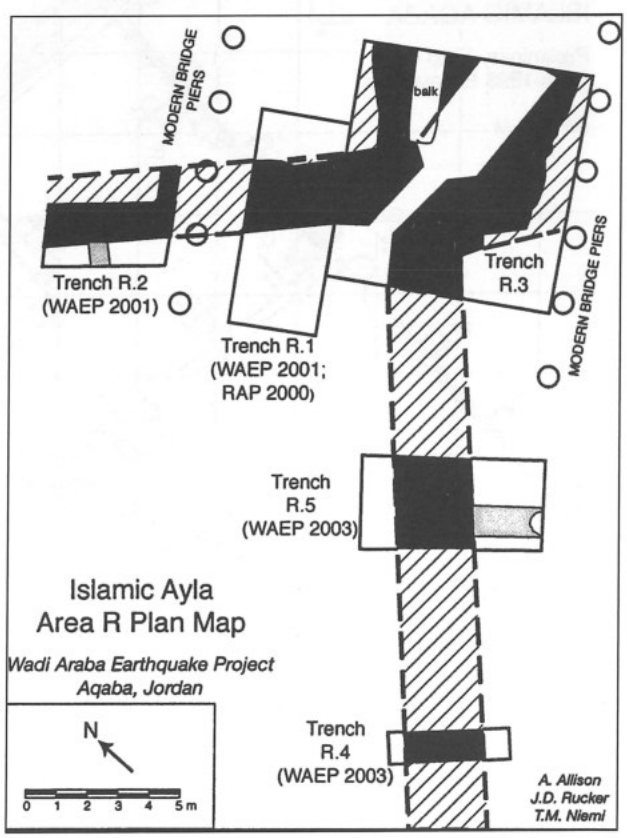
2a.Site Plan of Early Islamic Ayla, from Whitcomb 1995.



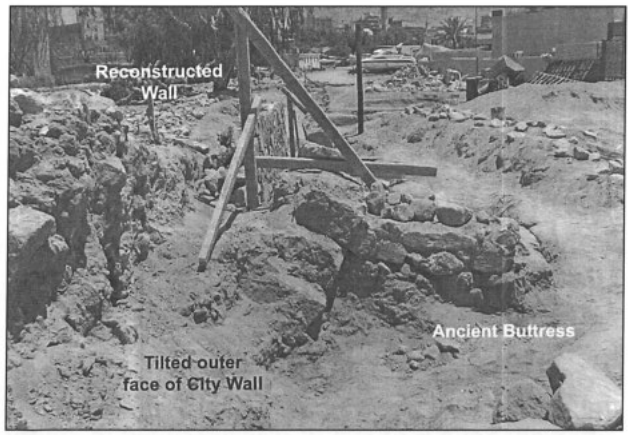
2b. Site plan of Early Islamic Ayla, incorporating our 2001 and 2003 survey data. This is not intended as a complete map plan, but only to include new data.

viously been excavated as Area R of the Roman 'Aqaba Project directed Dr. S. Thomas Parker of North Carolina State University (**Fig. 3**). Our goal was to trace the length of the wall under the bridge to see if there was any misalignment due to fault offset. We began by tracing the wall toward the west in the direction of the Syrian Gate. We exposed the entire 2.5m wide wall in a 1m wide plot west of the first row of bridge pylons. Only the interior facing stones of the City Wall was traced for a distance of approximately 6m to the west. Our excavation terminated at the bridge concrete footings. No offset in the trend of the interior of the City Wall was apparent to the west. We then traced the interior of the City Wall about 3m to the east of the Area R exposure.

During the 2001 field season, we surveyed visible architecture on the southeastern section of the site, using a total station, in order to record unpublished architecture and project alignments. The recent Department of Antiquities restoration project in the south corner of the site exposed walls that were included in our survey and the resulting site map (**Fig. 2B**). This reconstruction project also revealed a section of the Sea Wall that was tilted outward (**Fig. 4**). The outer edge of this section before excavation would have appeared on the ground surface 1.5 to 2m from the alignment of its



3. Site Plan of WAEP 2001 and 2003 excavation area, in the eastern corner of Early Islamic Ayla



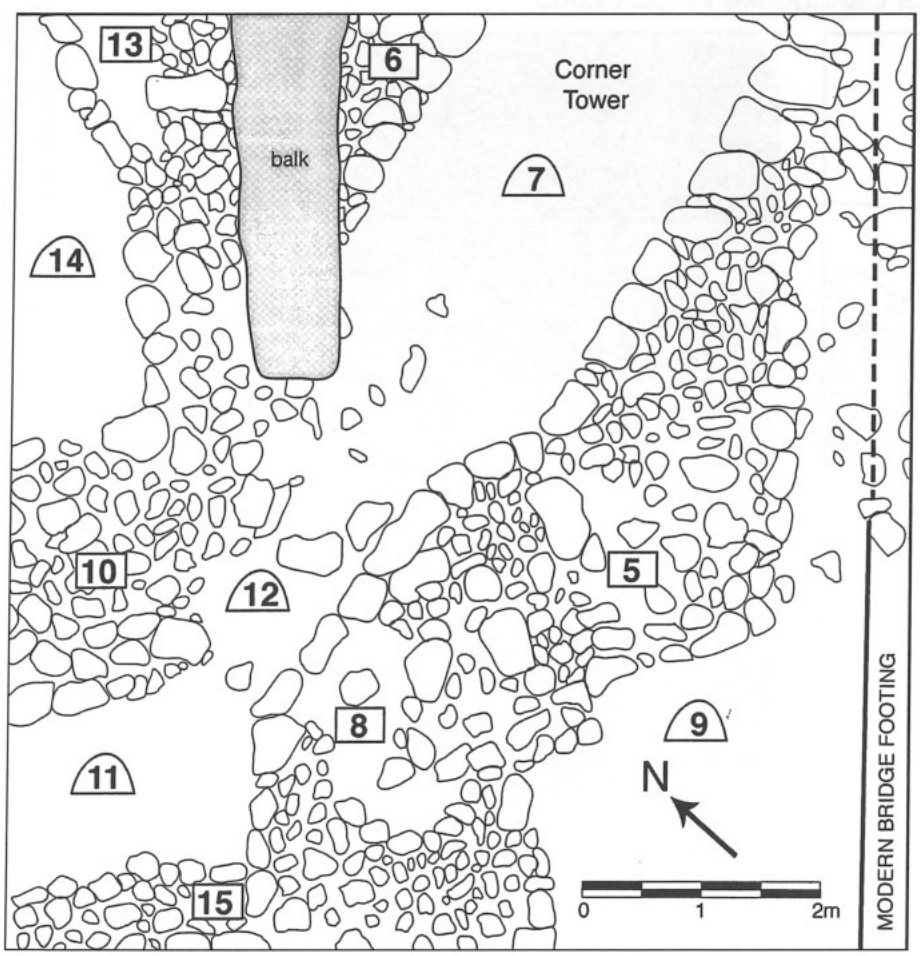
4. Section of Sea Wall, tilted outward and buttressed in antiquity, with reconstructed wall on original alignment in background, view to SE.

actual foundation. Interestingly, it appeared to have been buttressed and continued in use in antiquity. This phenomenon, (easily caused by liquefaction and subsidence, not faulting) may provide an explanation for the apparent misalignment in the Sea wall above foundation levels observed by Whitcomb and others.

Also in 2003, we also used ground penetrating radar to look for active faults within Wādī Ayla adjacent to the Ayla archaeological site and within greater 'Aqaba. No conclusive evidence for faulting in the wadi was found due to extensive cultural modification of the channel margins and fill. These results are reported in Slater and Niemi (2003).

Excavation in Area R, Islamic Ayla, was carried out for 22 days between July 6 and July 31, 2003 by Alivia Allison and John Rucker and ably assisted by Mr. 'Adnan Rafay'ah of the Department of Antiquities. In view of the goals stated above, three trenches were laid out and excavated this season: R.3 (on the projected position of the corner tower), and R.4 and R.5 (across the projected alignment of the SE city wall) (**Fig. 3**).

R.3: This trench was originally laid out as a 4m by 5m trench, but was expanded first to 5m by 8m, and then to 8m by 8m, as the location and alignment of the city walls and corner tower became apparent. The corner tower, at the level to which it is preserved, consists of an irregular curved exterior wall (cut by the footing trench for the modern bridge), and an interior diagonal rectangular room (**Fig. 5**). The trench contained 4 layers of soil and sand, consisting of modern wadi wash and con-

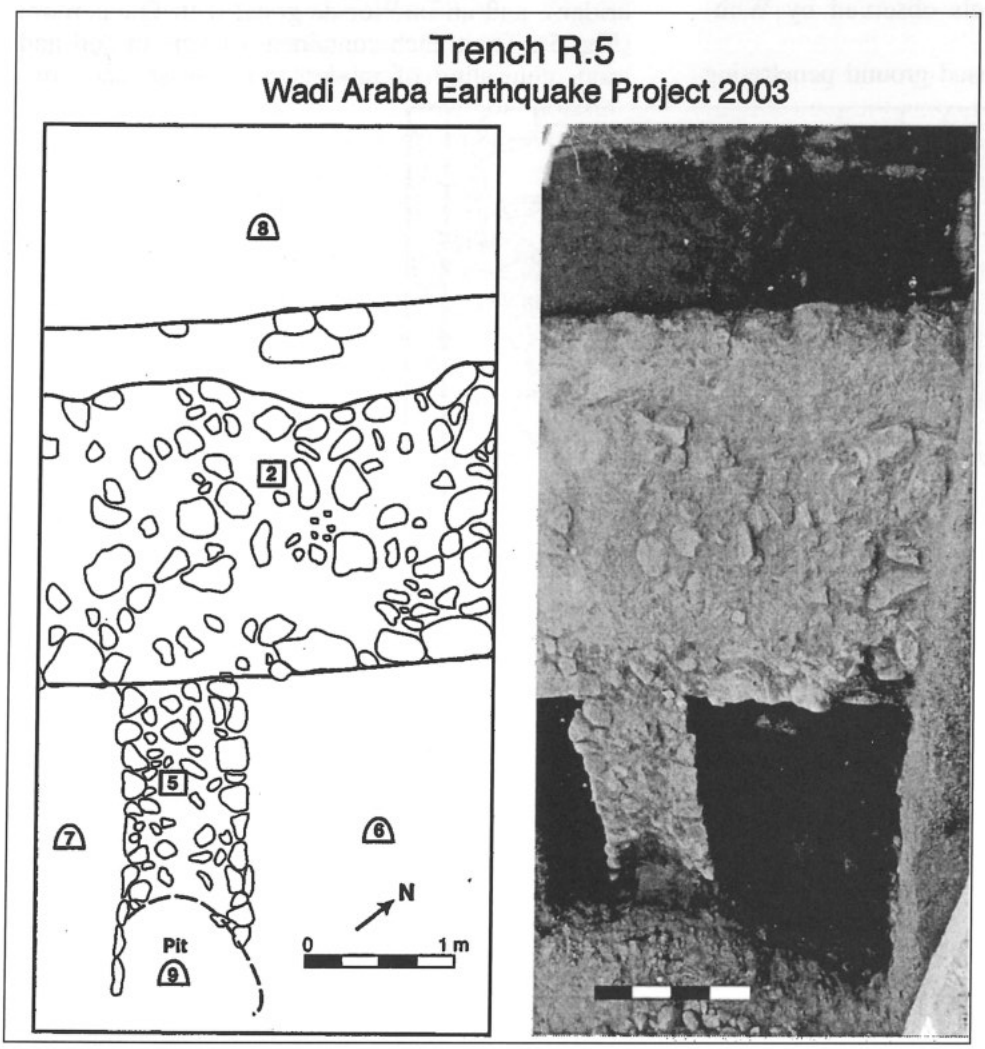


5. Top plan of Trench R.3, WAEP 2003.

taining modern material such as plastic, metal, rubber and asphalt. The city walls and tower walls are preserved to a consistent height, directly underlying the lowest of these four soil layers. Excavation continued into soil and sand loci around and between the architectural remains, as many of the faces of the walls were very unclear, due to both damage, and loose stones in the soil loci. It was at first thought that these might be ancient strata, but there is modern material present in even the deepest loci excavated. All loci in this trench contain pottery mainly from the Late Roman, Byzantine and Umayyad periods, but there are a few sherds of Early Roman/Nabataean date, and a small number of more recent sherds, including modern ceramics. Unfortunately, as the objectives of the project were met with both faces of both city walls, and the tower walls exposed, excavation was halted before stratified ancient levels were reached.

R.4: This was a 1m by 4m trench across the alignment of the SE city wall, approximately 3m NE of Whitcomb's (1995) Tower 11. The city wall was preserved to a level just below the topsoil, and the soil loci on either side of it also contained modern material. This section of the wall was in correct alignment with the remains of the city wall visible in the side of the wadi, as well as that exposed in trench R.5. Excavation halted in this trench once the objective of a clear wall alignment was met. Pottery collected from this trench was not dated, as all excavated loci clearly contained modern material.

R.5: This trench was originally laid out as a 3m by 5m trench along the projected alignment of the SE city wall, 5m NE of R.4. It was expanded to 3m by 6m when the wall alignment was seen to trend more west than originally thought. The city wall in this trench was exposed approximately 25cm below the surface, and was abutted by a smaller wall running to the SE balk of the trench. A modern pit was dug along the SE balk, cutting though this smaller wall (**Fig. 6**). The pit, and all soil layers reached in this trench, contained modern material (trash, met-



6. Top Plan and Photo, Trench R.5, WAEP 2003.

al, plastic, etc.). All pottery dates from this trench were inconclusive, as the presence of modern material noted above would suggest. All sherds, except one modern sherd, date from the Late Roman, Byzantine or Umayyad periods. Excavation also halted in this trench once the objective of a clear wall alignment was met.

Conclusions

The primary objective of these two seasons excavation was to test Whitcomb's wadi fault hypothesis. With the four trenches excavated we can see the wall alignment through the entire width of the wadi and we can conclusively state there is no fault offset present in the NE or SE city wall or through the corner tower in the wadi. The trenches excavated this season, combined with previous work, provide a complete view of the wall alignments of the NE corner of Islamic Ayla. If this does not refute it completely, it must at least throw serious doubt on the wadi fault hypothesis, and suggest a reexamination of the data for such an offset in the Sea Wall. This seasons findings do tend to provide some support (only in that they do not actively exclude this hypothesis) for the hypothesis proposed by Galli and Galadini (2001), that the fault actually runs through the NW wall to the Sea Gate. Another hypothesis that has gained some support this season is the idea that the wadi was originally dug, or at least enlarged and channelized by British military activity. All of the architectural remains in all of our trenches this season are preserved to approximately the same height, in some cases rather abruptly. This suggests the activity of a bulldozer, not seasonal wadi wash. Also, two of the walls had flat-lying pieces of modern asphalt lying on top of them, demonstrating that they were exposed at the surface at some point during the modern period. All soil/sand layers above the preserved top of the architecture in the wadi contain modern material. These factors strongly suggest a modern, man-made origin for the wadi.

This season's excavation has raised two important themes for future work in Islamic Ayla, however. First, and most important, the disproving of the wadi fault hypothesis allows a reexamination of the earthquake damage that certainly exists within the site. Galli and Galadini's (2001) faulting hypothesis must be more seriously examined, and the possibility of understanding the earthquake history of the site in terms of liquefaction and subsidence instead of faulting is an important one. Even if primary faulting is not present, this site still has great potential to yield very important earthquake chronology and intensity data that would help constrain epicentral location and magnitude of historical earthquakes. This is of great importance for both culture history and understanding probable future earthquakes. Research in this area would also allow a better understanding of the historic environment of the 'Aqaba region, particularly with regard to the level of the water table. Second, the wadi is the only area of the site where the original Umayyad phase(s) can be seen, without disturbing the later Abbasid phase structures extensively excavated in Whitcomb's multiple seasons. Continuation and expansion of the excavations in this area in future seasons offers the possibility of revealing the original phase of the Umayyad city.

Acknowledgments

This study was conducted as part of the Wādī 'Araba Earthquake Project under the direction of Dr. Tina Niemi. Funding for the field research was provided by two grants to T.M. Niemi from the Committee of Research and Exploration of the National Geographic Society (Award numbers 6842-00 and 7406-03). We are grateful to Dr. Fawwaz Al-Khraysheh, Director-General of the Department of Antiquities of Jordan (DoA) for granting permission to work in 'Aqaba and DoA representatives Sawsan Fakhri, Manal Basyouni, and 'Adnan Rafay'ah for their assistance. We acknowledge Drs. Donald Whitcomb and S. Thomas Parker for their previous work at the site, and for supporting our research efforts. We thank Nasser Mansoor for assistance in the field, and Drs. Pierre and Patricia Bikai, Kurt Zamora, Kathy Nimri, Humi Ayyoubi, and the staff at ACOR for providing logistical support in 'Ammān, Jordan.

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