

**Dakhleh Oasis Project**  
**New York University**  
**Excavations at Amheida 2009**  
**Geological survey**

On the Days, 1/28-29/09, 1/31/09, 2/2/09, and 2/3/09, I surveyed the environs surrounding Amheida in an effort to put the site into a regional environmental context. This was done, in part due to lack of access to the site itself, as well as to give me a slightly larger regional geologic perspective on the area, particularly since the Amheida site itself is so anthropogenically altered. I was accompanied on these expeditions by Dr. Ellen Morris, as well as groups of students. 2/4/09 and 2/5/09, we were allowed to visit the Amheida site with the company of an inspector. In this report, I shall discuss the sedimentary “units” that I identified during the course of my fieldwork in the region surrounding the Amheida site.

### **Spring Mounds**

Numerous spring mounds are present in the Amheida vicinity. These sediments, found across the Dakhleh area, are characterized by variably colored (white-bright yellow-ochre-orange-red-purple), fine grained silts, often also associated with blocks of ironstone. They are generally found as mounds standing several (up to ~7 m around Amheida) above the modern landscape. Studied in the Balat/Sheikh Muftah area by Adelsberger (2008), these features are interpreted to represent groundwater-fed wetland environments.

Stratigraphic relationships between spring-sourced sediments and overlying red cross-bedded sediments (description below) suggest that spring-mound formation in the Amheida had likely ceased before occupation of the site. This is based on the observation that the surface onto which the red cross-bedded sediments have been deposited is highly uneven, suggesting a period of intense aeolian erosion. The bedrock/spring sediment contact for the mounds near Amheida appears (visually; no measurements were made) than the modern surface, which also roughly corresponds to the contact level for the cross-bedded aeolian sediments upon which Amheida is partly built.

### **Red Cross Bedded Sediments**

Dark red (10R 5/6) sediments were identified to the south and southeast of the Amheida site. These sediments have been identified as fluvial based upon their variable grain size, presence of cross-beds, and composition inconsistent with an aeolian source. Mudcracks

have been identified within these strata, suggesting that these sediments may represent several fluvial pulses, followed by periods of desiccation. These sediments are also highly bioturbated, exhibiting abundant root casts, which are sometimes calcified, further consistent with a semi-arid climate.

Also of note is the archaeological assemblage associated with these sediments where they occur to the southeast of Amheida. A very large Holocene lithic scatter was found, as well as a large assemblage of early pottery. Middle Stone Age tools were also recognized; however, they were retouched and associated with much later archaeological material, suggesting that they were likely being used as raw materials for knapping.

### **Cross-Bedded Aeolian Sediments**

Of particular interest to the Amheida Project are cross-bedded Aeolian sands, which are found on the site itself, as well as (conclusively) to the east and west of the Amheida site. These sediments, comprising med-fine-grained, well-rounded, cross-bedded sand are exposed in yardangs. That extend as much as ~3 m above the modern surface, and are often bioturbated. Even away from the Amheida site, these yardangs are frequently capped by Roman pottery, suggesting that their tops represent a past occupational surface.

I was asked to specifically examine these sediments on the Amheida site, with the goal of understanding how dune movement might have affected site settlement. This interest was based upon some reports of finds of pottery in situ within the dunes (Figure 1). To address these issues, I examined exposures of aeolian sediment on the northern part of the Amheida site that had been mapped by Amheida topographers. In several outcrops, I identified multiple stratified sets of crossbeds. In two outcrops, mudcracks and thin layers of evaporates separating layers of crossbeds suggested that the surface was susceptible to periodic ponding and/or infiltration of water.

Regarding the reports of pottery in situ within the lake sediments, I was unable to come to any firm conclusions, since I was not allowed to excavate suspect layers in the sediments to verify that the suspect sherds were actually within the outcrop, and had not simply fallen there, and become plastered to the side of the outcrop during its erosion. They are generally found near (or slightly below) the contact between two sets of crossbeds. Although this might suggest an occupied surface that was later covered by dunes (and subsequently reoccupied?), this coincidence may also be due to the fact that the lower set of crossbeds is generally more resistant to erosion than the overlying strata. Hence, it could be acting as a

‘shelf’ upon which the artifacts might have landed. I think it is likely that in order to understand the phenomenon of this apparent in situ pottery, excavation of these deposits may be necessary.

Questions about the materials upon which many important structures at the Amheida site were constructed, that too requires more investigation. Exposures at the base of the “Pyramid” hill seem to suggest that some of the Amheida site may be indeed built on stabilized dune material. Based upon my observations across the site, I think it is certainly possible that the Temple may have been constructed on another such feature. Alternate possibilities include a fossil spring mound (many present in vicinity, blocks of ironstone found near top of hill), or a barren hill of Mut Fm bedrock (somewhat less likely, as it is unusual to find isolated hills of Mut Fm without a capping of Quaternary sediment). I am not certain that without full excavation of the top of this hill (or geophysical investigations) that it will be possible to establish the material upon which the settlements on the “Temple” hill were built. Further geologic investigations at the Amheida site might, however, provide insight into the degree to which these dune systems were active during occupation of the site.



Figure 1: Pottery apparently in situ within the aeolian sediments.

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