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Provenance of mortuary hematite artifacts at Petra, Jordan

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During a BYU archaeological excavation of Nabatean tombs at Petra, Jordan, Dr. David Johnson discovered hematite nodules that, he claims, contain the carved images or figures of several deities. These effigies were possibly ceremonial objects that served to protect the dead.

I arrived in Jordan at the end of April. Under the supervision of Dr. Johnson, I conducted a general hematite survey of the area in and around Petra, Jordan. During this survey I was able to locate several geographical sources of the hematite nodules. This survey was not comprehensive, but was a general reconnaissance of the area. As part of this reconnaissance, I: 1) observed the properties and relationships of the geologic strata, 2) noted the structural relationships of these strata, 3) searched for diagnostic iron-oxide weathering patterns which reveal high concentrations of hematite, and 4) examined the erosional stream deposits of the area for the presence of hematite nodules which I will then track upstream to their source. Additionally, I employed relevant information from past geologic surveys to facilitate this reconnaissance. I also marked the geographical location using a GPS receiver and topographic map. Their stratigraphic positions were noted, and the samples were collected and labeled. Finally, I analyzed these samples and compared them with the hematite artifacts from the tombs to determine if there is a possible match. I found that the nodules found in the tomb had a local source. I also observed that the majority of hematite nodules (if not all) recovered from the tombs, have not been carved or manipulated, but only appear to have been. The weathering and erosion of the nodules, in some cases, make them appear to have been manipulated.

Both specular hematite and earthy hematite occur within the surveyed area, as do iron-oxide rich sandstone veins and concretions. The hematite described in this survey formed after the initial deposition of the sandstone of this area. Hematite forms in areas where large amounts of iron-rich groundwater once passed. The groundwater in the Petra area flowed through fractures within the sandstone. This is evidenced by the veins of hematite found throughout the area. However, the hematite within the surveyed area, also occurs as nodules. These nodules formed as iron-rich groundwater flowed through the sandstone.

I discovered nodules of earthy hematite within the wash (alluvial sediments) of Wadi Mataha, Wadi Shib Qays, and Wadi Al Wuayra. These nodules vary in shape and size, although, most nodules are about fist sized, or smaller. They also generally have an irregular and bulbous shape. Some nodules have euhedral hematite crystals growing on the surface. We discovered the majority of the high quality crystalline earthy hematite nodules (like those found in the tomb), in the channel wash. These nodules appear to have originated from within the white KS sandstone.

Specular Hematite

The specular hematite has a metallic luster, is dark silver, and is red/dark purple when powdered. It is found in thin (cm) veins, and is associated with dark purple, yellow and red sandstone within

the Umm Ishrin sandstone. The veins are generally 10's of meters in length. Specular hematite veins were also sometimes found in association with large concentrations of iron-oxide rich sandstone concretions. Most of the specular hematite veins were found within a kilometer of the tomb site.

Earthy Hematite

The earthy hematite has a non-metallic/earthy luster and is dark red in color. Both veins and nodules of earthy hematite were discovered within the area. It occurs in dark red veins within the Umm Ishrin Sandstone and the white KS sandstone. These veins vary in length, thickness, and quality. Most are thin (a few cm's) and several meters in length. Some veins are up to 30 cm's in thickness and 10's of meters in length. The crystalline quality of the veins usually improves with the size of the veins. The sandstone in contact with the vein is invariably stained with the red color of the hematite.

The fairly abundant local source of the hematite nodules within the area (used for the production of these effigies), tells us that these artifacts may not have been highly valuable. The relative value of an object was often governed by the value of the raw material used for the production of that object. This was because of the significant energy that was required to transport raw material. Therefore, we can infer that a more distant source would signify a higher relative value and an abundant local source would signify a lower relative value. The discovery of the source of these hematite nodules, has allowed us to determine that the relative value of these artifacts is probably low. However, because of the abundant local source of hematite, the provenance of the hematite nodules did not shed light on the location of Nabatean mining areas, the trade and exchange of hematite throughout the region, or the mobility patterns of the Nabatean people.



Figure 1- Overlooking Petra



Figure 2- Iron-oxide stains in the Umm Ishrin Sandstone