Evaluating Cremation in Umm an-Nar period Mortuary Practices using Laser-Induced Breakdown Spectroscopy

Chemical changes in bone composition that occur during the process of cremation have begun to be explored alongside corresponding macroscopic changes to bone color using a variety of analytical instrumentation. This research employed a lesser-utilized method, Laser-Induced Breakdown Spectroscopy (LIBS), alongside Munsell Color Charts to assess elemental changes that may occur in archaeological bone at varying cremation temperatures. It was hypothesized that differences in color would be indicative of different chemical compositions present in bone, despite previous evidence for at least some diagenetic change. Distal humeri from Umm an-Nar (2700-2000 BCE) period tombs Unar 1 (n=31) and Unar 2 (n=28) (United Arab Emirates) were categorized by color (light brown/unburned, dark brown, black, dark gray, light gray, white/calcined) using Munsell Color charts. Their elemental composition (including C, Na, Mg, Al, P, Ca, Mn, Fe, Sr) was then assessed using a portable LIBS. Despite diagenetic changes that occurred within the bone as evidenced by increased Al, Mn, and Fe content, results from this study generally support the hypothesis, and were perhaps most clearly illustrated in changes to carbon. Other elements experienced similar changes, particularly in the calcination stage, but patterns tied to thermal alteration prior to calcination were less discernable. Unexpectedly though, calcined bones showed the lowest degrees of diagenesis, which may suggest that burning at high temperatures may offer some degree of protection against diagenesis.

Friday, April 15, 2022, 12:20 pm
CHEM 201

All Are Invited
Refreshments will be provided.