Introduction & Background

Museums and other repositories often contain donated artifacts that lack adequate documentation of their provenience and life histories. Southern Methodist University’s Bridwell Library possesses a brick believed to be from the Great Ziggurat at Ur. It is one of many Near Eastern artifacts in the A.V. Lane Collection but is not mentioned in the acquisition documents. It may have been added as an afterthought to the well documented clay tablets and inscribed bricks. Dr. Alfred Valentine Lane donated his collection in 1917, and it was displayed from 1920-1946. Artifacts were then added in 1942 and 1952. To assess the authenticity of poorly documented objects I employ archaeometric methods to determine its provenance and construction techniques. Results indicate it is not from Ur, but may result from rampant fraud that plagued the antiquities market in the early-twentieth century.


Evaluating the Authenticity of Curated Objects: Archaeometric Analysis of a “Brick from Ur”

Rachel M. Thimmig

Assessing Organic Content & Original Firing Temperature of the Brick:

Stepwise clay oxidation analysis paired with magnetic susceptibility and loss on ignition were used to examine whether the brick followed the trends of ancient Near Eastern brick-making with regards to firing behavior. Base measurements of magnetic susceptibility and mass were taken before the re-firing began. The color of the sample was also recorded according to the Munsell Soil Color System. The sample was fired in a muffle furnace at 100°C intervals from room temperature to 1000°C and held for 3 hours. In between each interval, magnetic susceptibility, mass, and the Munsell color were recorded. Mass specific magnetic susceptibility was calculated, then graphed as a function of temperature. The derivative of this function was squared, and the point at which the magnetic susceptibility deviated from zero (the first positive or negative spike) indicated the maximum firing temperature (Goodwin and Rollerbloom 2016).

The Brick’s Provenance: The Archaeometric Laboratory at the University of Missouri Research Reactor preformed neutron activation analysis on the sample to measure thirty-three elements. Results were interpreted using GSRun 8.0’s statistical analysis capabilities. Euclidean distances as well as elemental comparisons were made with the Missouri Research Reactor’s (MURR) and the Lawrence Berkeley National Laboratory’s (LBL) databases. These included ceramic and clay samples from archaeological sites in Iraq, Syria, Israel-Palestine, Jordan, and Lebanon to compare whether the elemental makeup of the brick resembles other clay artifacts from the region (Boulanger 2013).

Figure 1: Neutron Activation Analysis Graph

Methods

Stepwise Clay Oxidation Analysis and Magnetic Susceptibility

Estimation of Firing Temperature Based on Stepwise Clay Oxidation Analysis

Stepwise clay oxidation analysis showed a distinct change after 700°C, and magnetic susceptibility data showed a dramatic shift between the intervals of 600°C and 700°C. This puts the most likely maximum temperature around 650°C.

Results & Analysis

The upper left table shows Euclidean distances between the brick and Iraqi LBL samples. Measures less than 0.02 are considered related. Unfortunately, the brick is not statistically similar to any clay samples from modern Iraq. The scatterplot above and to the right shows major elements Al (x-axis) and Ca (y-axis). The circled point is the brick, and it is an extreme outlier. If the brick was from the same area, it would be in the cluster.

The table above shows Euclidean distances between the brick and over 75,000 samples from different databases. It is most similar to artifacts from the Levant dating to the Byzantine Era and not the first millennia BCE.

Discussion & Conclusion

Bridwell Library’s brick’s firing profile is consistent with others from ancient Mesopotamian ziggurats. The brick was fired in a temperature less than 650°C, perhaps to maintain the temporal structure of the spire. Neutron activation analysis indicates that the elemental makeup of the brick is statistically different from clays found in ancient Iraq. It is instead, most similar to clays from Palestine. This does not mean the object is from the Levant, only that the major and trace amounts of elements in the brick resemble those of the Levant.

SMU’s brick is not a strong match to any of the 75,000 clays in the databases. It is likely not from Ur or from any building in the ancient Near East dating to 3,400 BCE - 500 BCE. Dating the brick is the only archaeological method that would confirm whether the object was produced during the time of Ur’s occupation.