Identifying Differences in Funerary Practice from the Distribution of Fracture and Warping Found on Cremated Human Remains at a Bronze Age Cemetery

Aaras Troy1, László Paja2

1George Mason University, 2University of Szeged

Introduction

Purpose: The purpose of this research is to identify differences in funerary practices across the population of the Bronze Age cemetery at the Békés- Jágártvart site in the Kőrösi River region (Fig. 1).

Context: Different types of burial rituals have been discovered, including inhumations and cremations. Of the burials observed, cremations, where the bone fragments were deposited in decorated clay urns and buried in shallow graves (Duffy, et al., 2014). 68 burials have been excavated from the Békés- Jágártvart site (of which 58 are urn cremations), forming a sample of a cemetery population that may exceed 2,000 individuals (Duffy, et al., 2019).

Based on preliminary analyses, researchers did not find significant differences in the state of cremation. The uniformity can be a large indicator that the society living in the region during the Bronze Age either valued equal treatment of all members of the society, or had an absence of a formal hierarchy.

Cremation Analysis: In this study, heat induced fractures from cremated human bone are used to determine whether firing conditions were similar or varied within the cemetery.

Background

The number and type of fractures present can provide evidence of the status of the body at the time of cremation (Bikström and Svegler, 1989). Importantly, different firing conditions can result in the expression of different fracture types.

Dry oxidated bone is prone to cracking along the grain of the bone, along the osteon canals where protein denaturation takes place, causing the structure to collapse in a regular pattern (Symes, et al., 2015). These are the most common fractures for all cremations, but can be less expressed in fleshed remains as the bones are heated slowly through tissue (Tibbolker, 2008). Similarly, straight transverse fractures are found along long bone axes as heat travels their length—an effect amplified by increasing tissue thickness (Cernáko, 1990).

Curved transverse fractures (Fig. 3) occur on those bones when the soft tissue is destroyed causing the bone to bend and suffer from internal cracking (Symes, et al., 2015).

Pollina (Fig. 4) is a superficial cracking that occurs on the flat bone over long periods of heating, as collagen breaks down and makes the bone brittle (Bentzinger, et al., 2015). Warping (Fig. 5) is the structural collapse of bone as a result of the shrinkage process; it is exhibited of much higher frequency in fleshed bone (Tibbolker, 2008).

Materials and Methods

As part of a larger project (Choi, et al., 2017; Freiss, et al., 2019), this analysis focuses on five cremation urns' osteological material. Diagnostic fragments were analyzed as well as fragments larger than 3 cm. In addition, a representative 20% sample of the burial fragments was obtained from each burial (Bentzinger and Nowaczek, 2015). A simple random sampling method was achieved by evenly distributing equal quantities of human bone fragments from a single burial on 5 cm x 4 cm grid and using a random number generation method to identify 5 random grids that make up 20% of the material. Each postcranial fragment was then scored for the presence or absence of the following fracture types: longitudinal, non-directional, straight transverse, curved transverse, patina, and delamination (Symes, et al., 2015). Fragments used for scoring presence or absence were excluded from the list of the fracture type. Cranial bone fragments were scored for delamination, linear fractures, curved fracture, and patina. All cranial and postcranial fragments were also scored for the presence of warping.

The fracture data for each burial was grouped in four categories which represent distinct patterns associated with different pre-burning conditions at the time of cremation (Peter, et al., 2017). Associated with calcined and de-fleshed bones, longitudinal, non-directional, straight transverse fracture, and linear fractures are grouped as “Straight Fractures” (Symes, et al., 2015). The groups associated with intact, fleshed bones at the time of cremation are “Curved fractures” (includes curved transverse, transverse and curved fracture of cranial bone), and the group “Warping” which includes evidence of structural modification/warping on both cranial and post-cranial bone fragments, which can be an evidence of long exposure to lower levels of heat.

Discussion and Conclusion

Mostly Even Distribution: This study compared the distribution of fracture types that might indicate different pre-incineration state of the human remains. Because the burials in our sample did not show evidence of independence of the variables, there is support for the conclusion that the individuals were possibly cremated in the sameashed融媒体. If these were indications that remains were cremated with very different conditions of flesh, the distribution of fracture types would be testable for independence. In the most extreme cases, calcined or calcined bones will be of different fracture types than fully fleshed remains. With a sample of only 5 urns burials out of 58 urn burials of the Békés 103 site, different conditions are not visible. Importantly, this does not denies the possibility that remains did occur in cremation, but they were not expressed by variation in pre-incineration condition of the remains.

Different Levels of Pollina: Although distribution of patina was not found to be associated between burials at a statistically significant level, it is possible the discrepancy is due to other factor. One possible interpretation is that the relatively small sample size for fragments that were scorables for patina failed to capture a wider pattern across burials, as patina had fewer the fewer fragments scored than any other. As patina is associated with sustained heat applied to flat bone with collagen present (not thoroughly calcined), it is possible that some bodies were burned in funeral urns for longer periods than others before being burned in urns. Alternatively, the variability of the presence of patina can relate to the position of the body being burned by an uneven heat source. A larger sample across many more burials studying patina may discover a wider pattern.

Future Research: Analysis of more burials across the Békés 103 site should be conducted to determine if the pattern holds. With more data, it may be possible that trend will become evident in association with demographic characteristics such as sex or age group. This project is a part of a larger effort, where more and more urns will be analyzed in replicable ways, yielding further insight into the nature of the culture’s mortuary custom.

References


A special thanks is owed to the National Research Foundation Award (Award No. 14460820), Quinnipiac University, and the BAKOTA Research team.