

INTRODUCTION

CREMATION AND SECONDARY DEPOSITION:

Cremation does not solely consist of the act of burning. In fact, funerary rites can start prior to death and continue for generations after an individual passed away (Cerezo-Roman, 2014). Secondary deposition, the placement or processing of human remains post-cremation, has immense potential for cross-cultural variation. Even though burned bone is often more fragmentary than non-burned bone, it may still retain diagnostic characteristics that can be used in systematic post-burning practices and rituals. For example, a practice seen in the archaeological record of various European populations is that of systematic anatomical arrangement within secondary deposition (Gimbutas, 1965; Pankowska, 2016; Gobkopf and Gramsch, 2004; Andre et. al., 2013; Sorenson & Rebay, 2008; Vicze, 2001; Dusek, 1969). In other words, groups have been known to have a specific spatial arrangement of crania and postcrania within a burial pit or urn. By studying this phenomenon, we can gain more information regarding burial rites and rituals in a population.

SITE INFORMATION AND CONTEXT:

Central Europe during the Bronze Age exemplifies an increase in social complexity, consequently followed by social stratification (Earle et. al., 2015; Gilman et. al., 1981). The Bronze Age Körös Off-Tell Archaeology (BAKOTA) Project studies the site of Békés 103 in the Körös region of Hungary, which is the location of a cemetery where over 90% of burials are urn cremations (Paja et. al., 2016). As of 2016, the BAKOTA Project has excavated 58 human burials in which the remains are located within ceramic funerary urns (Paja, et. al., 2016). The funerary urns were microexcavated in levels ranging from two to four centimeters deep (Paja et. al., 2016; FIGURE 1). This method of analysis provides ample opportunity to examine the ratio between cranial and postcranial weight in each level, therefore allowing for the characterization of spatial distribution within the urn (Goncalves et. al., 2010).

THIS STUDY:

We investigated the correlation between cranial and postcranial weight throughout the funerary urn's microstratigraphic levels in order to characterize skeletal distribution. It was hypothesized that a significant, negative correlation between cranial and postcranial weight would indicate systematic anatomical arrangement within the urn (FIGURE 1). In order to further understand a variety of secondary deposition rituals, as well as contextualize the practices at Békés 103, an examination of the Human Relations Area Files (eHRAF) Archaeology and World Cultures databases was also performed.

MATERIALS AND METHODS

SAMPLE INFORMATION:

A total of 25 burials were weighed, each containing at least three levels of bone and one adult individual. Four burials included a second, younger individual (HB 27, HB 54, HB 62, and HB 66).

Following microexcavation, diagnostic elements as well as cranial and postcranial fragments greater than 5 cm were separated from the assemblage. Utilizing a sampling technique derived from Bontrager & Nawrocki (2008), 20% of the cremains from the remaining unidentifiable fragments were randomly collected. Skeletal elements were weighed using an Ohaus Scout Pro scale (accuracy of ±0.01 grams). Then, a sum cranial weight and sum postcranial weight were created for each level.

Human remains weighed:

- Diagnostic elements
- Cranial and postcranial fragments > 5 cm
- Cranial and postcranial fragments from the random 20% sample

STATISTICAL TESTS:

Pearson correlation and regression analysis were performed for each burial using the Statistical Package for the Social Sciences (SPSS).

eHRAF DATABASES:

The electronic Human Relations Area Files (eHRAF) databases are a compilation of various archaeological and ethnographic documents. These documents (books, monographs, journal articles, dissertations, manuscripts, field reports, etc.) are categorized by tradition/culture, then paragraphs within the documents are coded by subject matter. In this study, we searched for the keywords "cremate", "cremation", "cremate*", and "cremat*" in the context of all traditions. Here, we present four of these results, as they best exemplified the importance of studying secondary deposition in an anthropological context.

BAKOTA BURIALS:

Only four burials (n = 25) showed statistically significant results (TABLE 1, FIGURE 2). The four significant results all indicated a positive correlation (TABLE 1, FIGURE 2). The non-significant results consisted of both positive and negative correlations, with seventeen positive correlations and four negative correlations (TABLE 1).

eHRAF CROSS-CULTURAL STUDY:

Evidence demonstrating systematic practices regarding secondary deposition in numerous cultures and traditions are seen in the ethnographic accounts in the eHRAF World Cultures database. While systematic anatomical arrangement may not be practiced consistently, there are still systematic rituals in secondary deposition. Some Mongolian and Tibetan groups combine cremains with clay and water, sculpting the resulting mixture into small figurines, pagodas, or discs stamped with Buddhist and other sacred symbols (Chang et. al., 1956; Furer-Haimendorf, 1964; Bell, 1964; Shen et. al., 1953). The process of secondary deposition for the Aztecs was strongly influenced by social status. The cremains of a person of nobility were placed in a ceramic vessel and mixed with the cremains of sacrificial servants as well as jewelry and precious stones (Duran, 1975). In Cambodia, cremains were collected from the pyre and intentionally mixed together, formed into a figure of a person, then placed in a funerary urn (Aymonier & Thompson, 1953). Modern-day Japanese cremation practice consists of family members picking out the cremains with chopsticks, placing them in an urn with the postcranial remains concentrated at the bottom with the cranial remains on top. Additionally, the second cervical vertebra, the axis, is placed on top of the remains in order to resemble a seated Buddha (Pankowska, 2016; Davies & Mates, 2005).

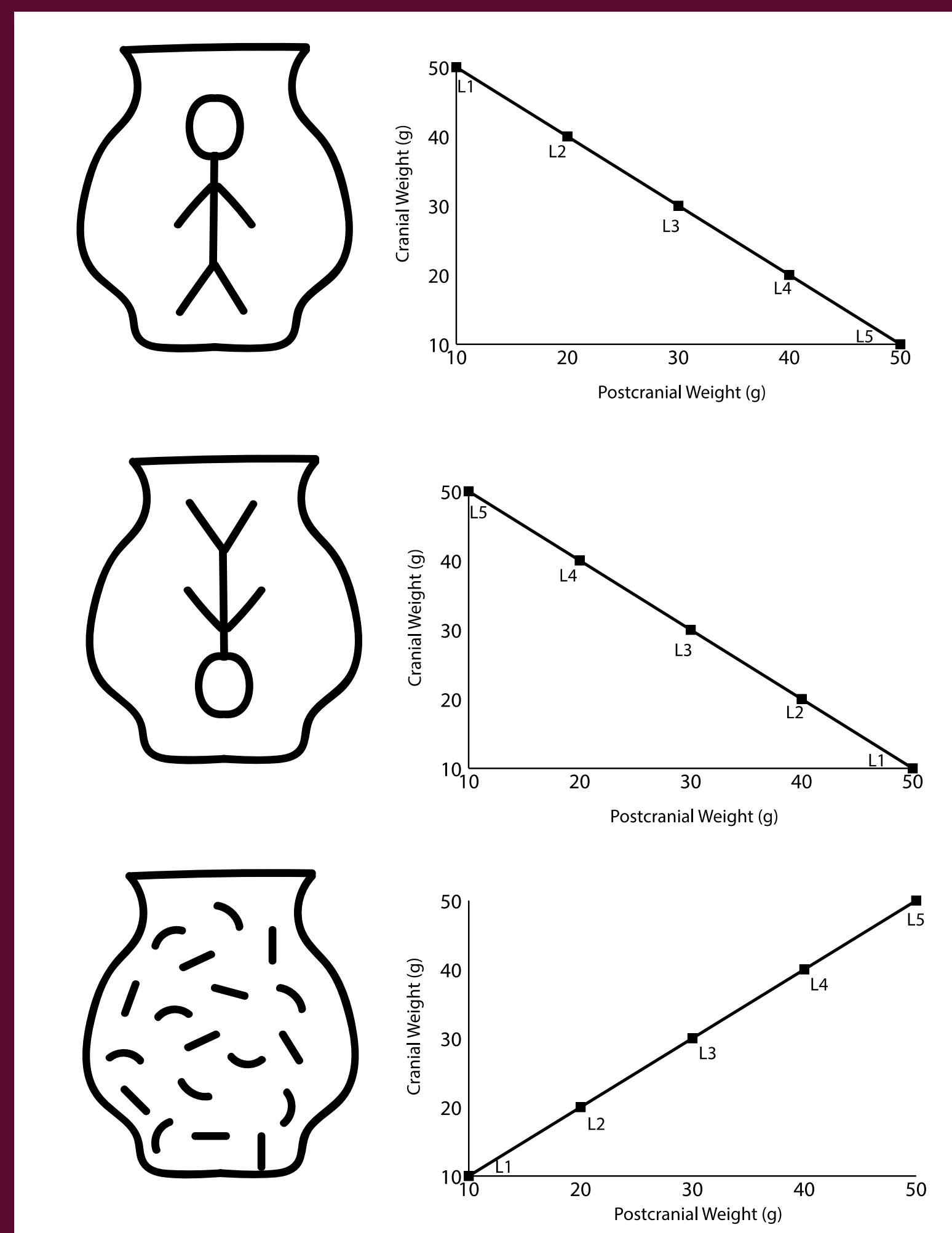


FIGURE 1. Expected Results. If there was evidence for systematic anatomical arrangement, there would be an inverse relationship between cranial and postcranial weight.

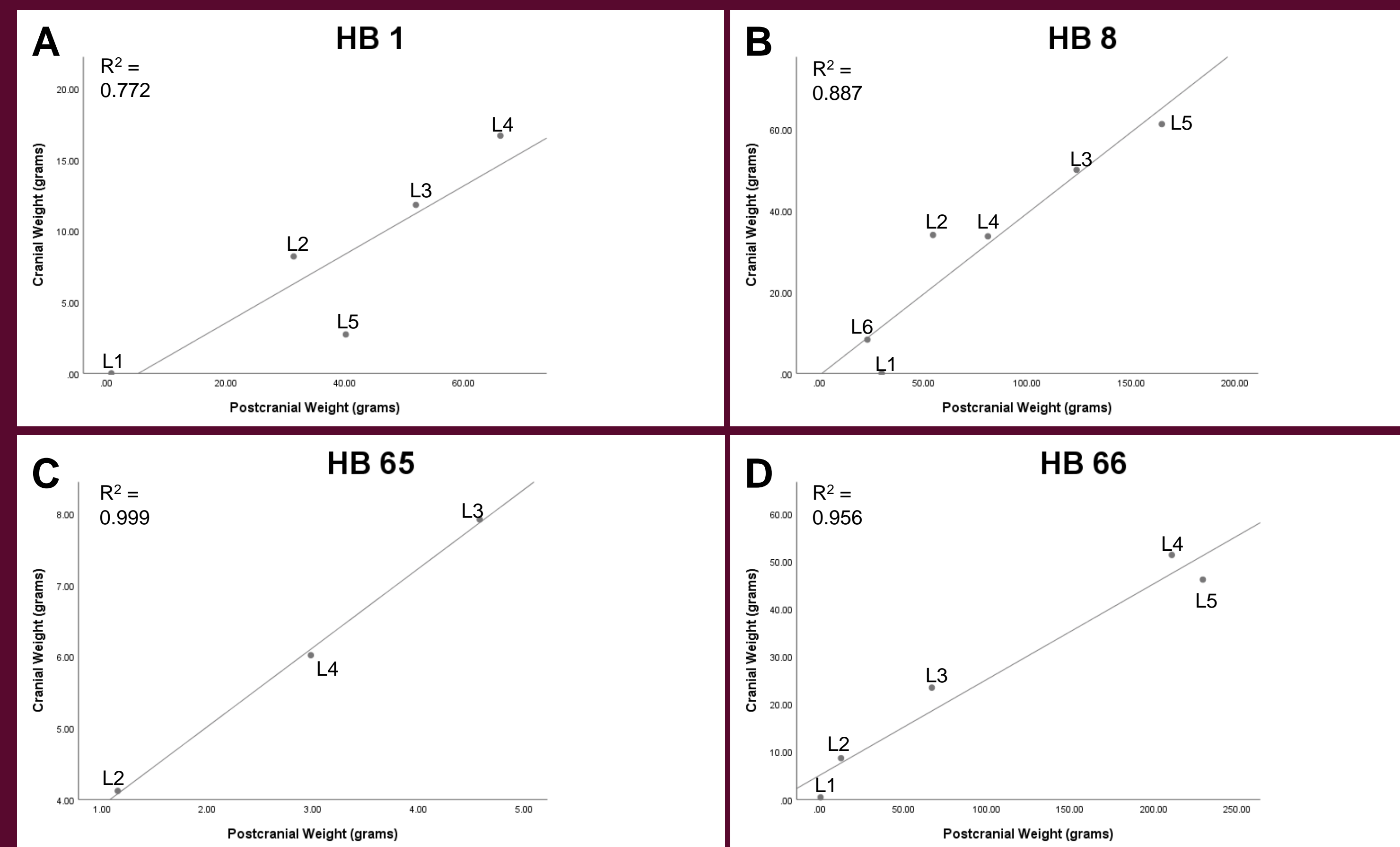


FIGURE 2. Regression Analysis of Cranial and Postcranial Weight in Burials with Significant Correlations.

- A) HB 1: Positive correlation. Most of the cranial and postcranial weight is concentrated in level 4.
 B) HB 8: Positive correlation. Most of the cranial and postcranial weight is concentrated in level 5.
 C) HB 65: Positive correlation. Most of the cranial and postcranial weight is concentrated in level 3.
 D) HB 66: Positive correlation. Most of the cranial weight is concentrated in level 4, while most of the postcranial weight is concentrated in level 5.

DISCUSSION

BAKOTA BURIALS:

If the cranial elements were placed at the top of the urn and the postcranial elements were concentrated at the bottom of the urn, then there would have been a negative correlation where the levels are in numerical sequence (FIGURE 1). If the cranial elements were placed at the bottom of the urn and the postcranial elements were concentrated at the top of the urn, then there would have been a negative correlation with the levels in reverse numerical sequence (FIGURE 1). While there were 4 burials with negative correlations, none were significant (TABLE 1). HB 21 was the best example of a negative correlation with cranial elements concentrated at the top of the urn, but this was not a significant result. This result was the closest to representing our hypothesis. The significant correlations between cranial and postcranial weight across microstratigraphic levels were all positive correlations (TABLE 1, FIGURE 2). This demonstrates that as overall skeletal weight increased, both cranial and postcranial weight increased. A positive correlation provides evidence for non-systematic anatomical arrangement in secondary deposition (FIGURE 1).

eHRAF CROSS-CULTURAL STUDY:

Bioarchaeological evidence for systematic anatomical arrangement in secondary deposition exists, but is mostly noted in recent studies focusing on European regions and populations (Gimbutas, 1965; Pankowska, 2016; Gobkopf and Gramsch, 2004; Andre et. al., 2013; Sorenson & Rebay, 2008; Vicze, 2001; Dusek, 1969). This does not mean that European groups were the only cultures in the past to engage in this practice. In fact, we propose that this aspect of past mortuary rituals may be overlooked by archaeologists due to a lack of appropriate methods for identifying patterns like systematic anatomical placement. In order to account for the disparities in the archaeological record, a review of ethnographic accounts was needed to gain a fuller understanding of practices in secondary deposition.

Evidence demonstrating systematic practices regarding secondary deposition in numerous cultures and traditions are seen in the ethnographic accounts in the eHRAF World Cultures database. While systematic anatomical arrangement may not be practiced consistently, there are still systematic rituals in secondary deposition. These rituals reflect societal values and behaviors such as social class, kinship, religion, etc. In the context of Békés 103, this demonstrates that mortuary practices can reflect factors such as social class and inequality, which has the potential to be reflected in Bronze Age Hungary.

RESULTS

Burial Number	Pearson Correlation	R Square	P-Value
1	0.879	0.772	0.05
6	0.135	0.018	0.75
8	0.942	0.887	0.005
10	0.476	0.226	0.418
11	0.831	0.691	0.375
12	0.981	0.124	0.962
13	0.328	0.108	0.787
15	0.837	0.7	0.077
21	-0.777	0.604	0.223
24	-0.015	0	0.98
27	0.029	0.001	0.957
31	0.22	0.049	0.78
39	0.242	0.058	0.695
41	0.355	0.126	0.645
45	-0.013	0	0.978
46	-0.267	0.071	0.828
47	0.854	0.729	0.065
48	0.641	0.411	0.244
49	0.891	0.794	0.109
54	0.832	0.691	0.081
62	0.114	0.013	0.83
64	0.644	0.415	0.554
65	0.999	0.999	0.025
66	0.978	0.956	0.004
69	0.877	0.768	0.123

TABLE 1. Correlations Between Cranial and Postcranial Elements

CONCLUSION

Cross-culturally we find that a variety of practices involving remains after cremation occur and can reflect the values and behaviors of a group (religion, social class). Our results show that none of the 25 urn cremation burials from Békés 103 analyzed in this study demonstrate an inverse relationship of cranial and postcranial elements within the urns as hypothesized. However, this does not necessarily indicate that less effort or care was taken in burying the cremains. For example, there is no evidence of ash. The lack of ash suggests each fragment was carefully picked from the pyre and placed in the urn, therefore still demonstrating potential for systematic rituals in secondary deposition. As seen in ethnographic accounts, it is also possible that the cranial and postcranial remains were intentionally mixed together before being placed in the urns. Overall, this study provides an innovative technique for quantifying anatomical arrangement in secondary deposition, and demonstrates the potential for studying secondary deposition in bioarchaeology.

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REFERENCES

A full list of references is available upon request.