Public Abstract

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Title:Intrinsic Properties of Bone as Predictors of Differential Survivorship

Investigating intrinsic properties as determinants of bone survival has major implications in forensic anthropology. It is useful in the incomplete recovery of a skeleton to know if certain bones that are missing are those that are expected to be missing. Assuming complete recovery, individual skeletal parts should have different recovery probabilities. This research examines the differential survivorship of human skeletal remains based on intrinsic properties (density, size, and shape) of bone. Fifty skeletons from the William M. Bass Forensic Skeletal Collection at the University of Tennessee-Knoxville were measured to determine bone length (cm) and shape (sphere, disc, rod, or blade) for twenty skeletal elements. Density measures (HUs) of skeletal parts were recorded for 11 skeletons from the Texas State University Donated Skeletal Collection. These intrinsic variables were then compared to recovery frequencies from a forensic sample of Arizona-Sonoran desert border crossers ($n=380$). This study found a correlation between bone length and frequency ($\rho=0.46$) and significant differences in the mean recovery frequencies for shapes ($p < 0.05$). Though no correlation was found for skeletal part density and frequency ($\rho=-0.21$), structurally dense midshafts of long bones are recovered with a greater frequency than their corresponding epiphyseal ends ($p < 0.001$). Furthermore, structurally dense crania have the highest survivorship potential (89%). This study substantiates differences in mean recovery frequencies for skeletal elements according to anatomical location ($p < 0.05$). Anatomical regions and recovery frequencies were used to produce a simple taphonomic model. Educating law enforcement on the value and appearance of high survivorship bones in the taphonomic model is a recommendation to improve policy and practice.