



## Physical Anthropology Section – 2007

### H95 Sifting Through the “Ashes”: Age and Sex Estimation Based on Cremains Weight

Traci L Van Deest, BA\*, California State University, Chico, Department of Anthropology, 311 Butte Hall, Chico, CA 95929

The goal of this presentation is to: 1) to examine the relationship of cremains weight and age and sex; and 2) to address the discrepancy in average weights found in previous studies in comparison to a large sample from northern California.

This presentation will impact the forensic community and/or humanity by demonstrating the potential use of cremains weight in the estimation of age and sex from cremated human remains.

Cremated human remains have been the focus of numerous studies in recent years. This research has focused primarily on the use of coloration, shrinkage and fracture patterns to deduce the duration of heat exposure, as well as the condition and placement of the remains before contact with fire. Little research has been conducted into final cremains weight and the information which may be gleaned from it. Due to the practice of pulverization of fragments in modern cremations, traditional methods of sexing and age estimation are lost. Three studies have addressed this issue using cremains weight, with varying results. Sonek (1992) presented his findings at the 44th AAFS Annual Meeting, and reported a mean weight of 2380g for the group and 2824g and 1922g for males and females respectively. Warren and Maples (1997) showed similar results in their study of 100 individuals, with a mean weight of 2430g for the group, 2893g for males and 1840g for females. Interestingly, Bass and Jantz (2004) found that remains from a commercial crematory in Tennessee weighed approximately 500g more for both males (3379g) and females (2350g) than the Sonek (1992) and the Warren and Maples (1997) studies. Bass and Jantz (2004) suggest that these higher weights are due to regional differences in populations, with people having higher bone density in Tennessee due to higher obesity rates in comparison with Florida and California. With so few studies addressing this issue, the examination of another comparative sample can address discrepancies between previous studies, in particular whether regional distinctions in populations are the underlying cause of the difference.

The sample used in this study comes from the Newton-Bracewell crematory, located in Chico, California. Beginning in December 2003, crematory staff began weighing the cremains prior to release to the next of kin in order to combat potential litigation. With an average of twenty cremations monthly, each cremation was weighed on a postal scale and measured in pounds. The weight in pounds was converted to grams using the equation: Lbs x 453.6 = Grams. The cremains were weighed after placement into an urn, with the weight of the urn previously recorded and subtracted from the total. The sex, date of birth and death, cremation date and operator of the cremation were compiled using the operator's log, along with the permit for disposition of the body. The decedent's age was calculated from the birth and death dates. Unfortunately, the actual body weight at death was not obtained but the approximate body weight was noted for each individual by the funeral home staff. Individuals with a body weight at death higher than 300 lbs for males and 200 lbs for females are examined in this study to determine if higher body weight results in higher cremains weight.

Preliminary analysis of a subset (n=272) of the larger Chico sample produced the following results. The average weight for the group ( $X=2683g$ ), males ( $X=3177g$ ) and females ( $X=2218g$ ) are similar to the mean weights reported by Bass and Jantz (2004). The difference between males and females is significant ( $t=11.45$ ,  $df=258$ ,  $p=.001$ ), confirming the results found in all previous studies (Bass and Jantz 2004, Sonek 1992, Warren and Maples 1997). The correlation between cremains weight and age also confirmed previous findings. Cremains weight was found to decrease as age increases, with females ( $r^2=.294$ ,  $p=.001$ ) decreasing more rapidly than males ( $r^2=.178$ ,  $p=.001$ ). The preliminary sample did not yield a sufficient subset of males over 300lbs and females over 200lbs for analysis. Further research is needed to confirm these results for the larger Chico sample, as well as address the relationship between body weight and cremains weight. These results are expected to play an important role in future civil and/or criminal litigation concerning cremated remains, in both a forensic capacity and for the funeral industry.

#### References:

- 1 Bass, William and Richard Jantz, Cremation Weights in East Tennessee. *Journal of Forensic Science*. 49(5):901-904
- 2 Sonek, Alexander, 1992, The Weight(s) of Cremains. *Proceedings of the 44th Annual Meeting of the American Academy of Forensic Science*. New Orleans, LA. Feb. 17-22. P169-170
- 3 Warren, Michael and William Maples, The Anthropometry of Contemporary Commercial Cremation. *Journal of Forensic Science*. 42:417-423.



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Cremins Weight, Age, Sex