



A45 The Accuracy of Visual Pair Matching of the Humerus of a Large-Scale Commingled Assemblage

Carrie B. LeGarde, MA, Defense POW/MIA Accounting Agency, 106 Peacekeeper Drive, Bldg 301, Offutt Air Force Base, NE 68113*

After attending this presentation, attendees will understand the reliability and interobserver variability of visual pair matching of the humerus.

This presentation will impact the forensic science community by illustrating that visual pair matching by anthropologists can be confidently relied upon, particularly by those with experience with commingled human remains.

Commingled human remains pose a particularly difficult challenge for identification, particularly when the commingling is large-scale. DNA analysis is often heavily relied upon to segregate these remains into discrete individuals, but this can be time consuming and costly. Anthropological methods, such as pair matching, can be employed when possible to limit the number of elements that require DNA sampling. The purpose of this study was to determine the accuracy rates of visual pair matching for multiple observers with a variety of educational and experience levels.

The sample for this study involves left and right humeri ($n=287$ and $n=293$, respectively) from the commingled remains of the USS *Oklahoma*, which are currently being segregated and identified by the Defense POW/MIA Accounting Agency (DPAA). The humerus was chosen for this study for two reasons: (1) there is a relatively high degree of bilateral asymmetry exhibited as compared to other long bones, which could make visual pair matching more difficult; and, (2) all left and right humeri in the assemblage were sampled for DNA analysis, which could allow for the accuracy of pairs to be determined. Although less than half the DNA testing has been completed, accuracy was determined for those that have been tested. Five anthropologists completed this study with osteological experience ranging from 2 to 13 years, with the following education levels represented: post-BA ($n=1$), post MA ($n=1$), and post-PhD ($n=3$). Experience with segregating Commingled Human Remains (CHR) was also considered and separated into three categories: none ($n=1$), minimal ($n=2$), and experienced ($n=2$).

All left and right humeri were placed on ten tables for analysis. The observers were instructed to pair left and right humeri using four categories based on confidence level: (1) match (confident); (2) probable match (fairly confident); (3) possible match (not confident); and, (4) no match. Methodology for pair matching was not specified, but observers were instructed to document their process to examine differences in methodology. Only results for those categorized as “match” are given below. Additionally, matches between observers were compared and examined for congruency.

The amount of time required to complete the pair matching assessment ranged from 35 to 55 hours, but methodology was similar for all observers. The total number of visual pair matches ranged from 88 to 156. The observer with no CHR experience paired the least and all other observers paired between 144 and 156 humeri. The accuracy of pair matching for the five observers ranged from 80% to 100%, with the two experienced CHR observers having the highest accuracy (98% and 100%), followed by the observer with no CHR experience (96%). This reveals that the least experienced observer was more conservative by pairing the fewest humeri (by nearly half), but demonstrated high accuracy for the visual pair matches made. Accuracy was not found to correlate with level of education.

These preliminary results reveal that visual pair matching has relatively high accuracy, regardless of education or experience level; however, this accuracy increases with experience. Results suggest that visual pair matching by anthropologists experienced with commingled human remains are exceptionally accurate and can be relied upon with confidence. These results are preliminary and may change as additional DNA results are received.

Pair Matching, Humerus, Commingled Human Remains