H96   Cremated Tooth Morphology: A User's Guide to Identification

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After attending this presentation, attendees will understand how to identify burnt and fragmented dentition using external crown and root as well as internal pulp cavity and root canal morphology.

This presentation will impact the forensic community by providing a detailed methodology for the identification of cremated dentition and by enabling practitioners to rapidly identify cremated dentition for the estimation of the minimum number of individuals, creation of postmortem dental records and interpretation of burn patterns.

Conventional dental identification focuses on crown morphology as the most unique and most easily observed dental trait, but is of little use in cremations where the crown enamel commonly shatters into tiny shards. Dentine roots survive cremation and may even survive pulverization in a modern crematorium, but few authors address the subject of how to identify cremated dental fragments.

To create a stringent identification system for forensic applications, this study applied population frequencies of both external and internal dental morphology to identify the dentition of the Late Bronze Age West Overton G 19 Cremation Cemetery housed at the University of Central Lancashire. An archaeological sample was chosen because the implantation of dental appliances alters tooth morphology and has been documented to impact cremation fragmentation patterns. Fragments from a previous analysis were observed with the aid of a magnifier and macroscope.

Though a text book will picture the average tooth, actual teeth exhibit a great degree of variation in cusp, root and root canal number due to individual and regional differences. To account for this variation, identification was broken into six levels of certainty from broad traits shared by several teeth to very specific traits unique to a single tooth. The "uniqueness" of each trait was determined by White population frequencies reported in the dental literature and observations of British Medieval, Bronze Age and Victorian skeletons housed at the University of Central Lancashire.

Fragments were identified to 6 increasing levels of certainty: (1) **Position** as anterior or posterior was determined by the number of cusps, roots, and pulp horns and the curvature of the cementum enamel junction, (2) **Tooth type** of incisor, canine, premolar or molar was based on the number and shape of cusps, pulp horns, roots, and root canals, (3) Differences in morphology, size and thickness of dentine and enamel between permanent and deciduous teeth identified **dentition set**, (4) Jaw as maxillary or mandibular was determined by differences in root, cusp, pulp horn and root canal shape, (5) **Side** determination as left or right was only possible when the arrangement of cusps or roots identified the mesial or distal side, such as the placement of the hypoconulid distally in mandibular molars, and (6) Identification of tooth **number** as first, second or third was also difficult as many teeth vary little or inconsistently between sequential teeth.

The analysis of 479 dental fragments of 18 individuals (8 juveniles and 10 adults) identified the majority of fragments (74%) to position, most (66%) to dentition set and type, about half (45%) to jaw, and some to side (15%) and number (10%). Of the 479 fragments, only 26% did not contain enough features for identification, compared to the 50% not identified in a previous analysis using external morphology alone.

In forensic applications, this marked increase in identification may improve the estimation of the minimum number of individuals (MNI) and reconstruction of perimortem events. Anterior teeth have been observed to suffer a higher degree of fragmentation and burning in vehicular crashes, but survive intact when the body decomposes prior to incineration. The high identification rate (74%) of fragment position may then indicate the timing of cremation in relation to time of death. The identification of fragments to dentition and type (66%) is used in estimation of the MNI through repetition of teeth and presence of deciduous teeth.

Dentition, Cremation, Identification