

Collaborative Doctoral Award: A Reassessment of Tooth Wear for Determining Age at Death in British Archaeological Remains

Research area: Human Bio-archaeology

Supports: NHPP Supporting Actions - Methodological and Technical Development

University Partner

University of Southampton

Project Summary

In archaeological environments teeth are the most resistant bodily tissue to degradation & decomposition. In life, they experience constant attritional wear and the rate of tooth wear offers potential for age assessment within a given population.

The most commonly employed dental wear method for assessing adult ages in archaeological populations from Britain (Brothwell, 1963) was developed using a poorly dated archaeological sample of unclear size. The method is neither accurate nor precise, and does not consider variation over time and dietary changes. Research has suggested that crown height (Mays et al 1995, Mays 2002) and mandibular corpus height (Mays 2014) may be good indicators of age, but the latter method has not yet been widely applied or tested for cross-sample validity. Other methods of ageing, such as the transition method (Boldsen et al 2002), rely on preservation of fragile skeletal elements or are destructive, expensive or complex & time consuming. Brothwell's method of age estimation is thus still widely used in British skeletal studies.

Without accurate methods of age assessment, studies of past disease prevalence are meaningless. The project will develop a more accurate, low-cost, non-destructive methodology for ageing human skeletons via dental wear. The method developed will be applicable to populations across England and, potentially, the wider world.

The studentship will evaluate the rates of tooth wear within English skeletal samples from Neolithic to Medieval periods and the variation at inter-population, regional and temporal levels. The studentship will examine how such variation should be considered when assessing skeletal age-at-death. The project will focus on exploring how the Brothwell (1963) method of assessing age from occlusal toothwear patterns can be refined and improved to increase reliability and precision. The key aim will be to reconsider age assessment via dental wear and mandibular morphology. Patterns of attrition & alveolar bone resorption will be studied from a range of collections to produce population specific dental profiles. Sources of variation in dental wear will be explored using historic, ethnographic & forensic dental data.

Methods will include recording and quantifying occlusal & interstitial attrition patterns, measuring and recording crown heights, heights of the mandibular corpus at defined alveolar locations & at the mental foramen, examining length of the dental arcade relative to mandibular length and observing microwear patterns. Rates of attrition will be compared between populations and age sequences adjusted for variation shown within groups. Estimates of age will be developed combining knowledge of eruption ages with levels of expressed attrition. MicroCT will also be employed, with collaboration from muVIS (University of Southampton), in order to assess whether age-matched internal dental structures, microstructure of dental wear and tooth root morphologies might be

identified and further defined. This greater detail might increase precision in ageing. Furthermore, application of Bayesian methods will also further improve age structuration.

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