



Physical Anthropology Section - 2012

H111 Forensic Anthropology and the Art of DNA Sampling

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The goals of this presentation are to outline the best skeletal sampling strategies for forensic DNA analysis and the importance of basic genetic knowledge when working within a field that strives for the positive identification of human remains.

This presentation will impact the forensic science community by discussing the benefits and advantages of various ways to sample the human skeleton for DNA analysis, the elements of the skeleton most likely to yield subsequent DNA profiles and how depositional environment or alteration of the remains may impact the ability to produce a DNA profile for positive identification.

The use of DNA technology for the positive identification of skeletonized and decomposed remains has become increasingly relied upon within the forensic community. While the forensic anthropologist plays an essential role in estimating descendant characteristics from skeletonized remains, such as age-at-death, biological sex and ancestry, as well as discerning peri-mortem trauma, estimating the postmortem interval and taphonomy, the actual positive identification is often done by the forensic DNA analyst. Therefore, the positive identification of human remains is most often a collaborative process incorporating multiple specialties within forensic sciences.

The process of obtaining analyzable DNA from bone is a destructive, timely and costly process. As experts in the human skeleton, forensic anthropologists are often responsible for the selection of skeletal elements for DNA analysis or consulting with coroners and medical examiners on appropriate samples for successful DNA profiling. Choosing the appropriate area of the skeleton to sample or amount of bone to be submitted for DNA typing can influence the success of subsequent examinations. It is important for the consulting anthropologist and DNA analyst to recognize how different sampling strategies influence subsequent osteological analysis, as some strategies involve cutting and removing large portions of the bone or sending entire skeletal elements for genetic analysis and therefore losing landmarks for discrete or metric investigations. In addition, sampling strategies can influence subsequent DNA analyzes as some skeletal elements can be more or less likely to produce genetic profiles based on intrinsic factors of the bone itself. Lastly, environmental factors such as heat and moisture play a large role in DNA preservation and having a basic working knowledge of those factors that are detrimental to DNA preservation may save time and money on fruitless genetic analyzes in situations where no analyzable DNA is likely to remain within the bone.

The goal of this presentation is to explore differences in basic DNA knowledge between forensic anthropologists working within different institutional contexts, such as government versus academic organizations and highlight the frequency at which forensic anthropologists are sending skeletal samples for genetic analysis. The different sampling strategies performed by practicing forensic anthropologists will be presented along with a discussion of the benefits and disadvantages of each technique. The intrinsic and extrinsic factors influencing molecular taphonomy will be discussed within the context of recent research and case studies to highlight the importance of a working knowledge of DNA and genetic technologies for a practicing forensic anthropologist.

Forensic Anthropology, DNA Sampling Strategies, Genetic Profile