H18 A Pilot Study on Nuclear DNA Recovery From Charred White-Tailed Deer (*Odocoileus virginianus*) Bone Tissue

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After attending this presentation, attendees will understand recovery of compromised DNA from charred bone remains from three commonly used incendiary liquids.

This presentation will impcat the forensic science community by identifying if certain bones yield more DNA than others, especially after being burnt, although this study uses white-tail deer as an animal mode. Criminals often attempt to hide proof of the crime by burning evidence. Both wildlife and human homicide investigators will benefit from the results charred bone DNA analysis can give to their respective forensic inquiry.

The proposed study utilizes White-tail deer (*Odocoileus virginianus)* as an animal model to study the effects of different accelerants on long bones. The sample location (i.e., tibia, femur, and/or patella) was also compared to determine the best area from which to extract DNA. The population for the proposed study is legs from white- tail deer recovered from road kill. Samples were obtained in conjunction with the Pennsylvania Game Commission from Pennsylvania roadways. Time of death was estimated using ocular fluid reflectivity based on an established index used by wildlife officers. One of the legs was reserved as a control from each specimen. The remaining three legs were incinerated with gasoline, kerosene, or lighter fluid respectively. These accelerants are considered to be the most commonly used to conceal criminal behavior by investigators. This study will comprise a total of ten deer, with an associated sample size of 40 appendages, using three bone fragments from each appendage.

Appendages were soaked in a heated solution of water and sodium carbonate to ease removal of the soft tissue surrounding the bone. After elimination of all adhering tissue, each bone fragment was pulverized in a sterile coffee grinder. DNA from the subsequent bone powder was extracted using the standard silica ancient DNA protocol (Paablo and Moss). Each sample was genotyped using a custom designed STR multiplex. Multiplexing utilized primers previously designed by Anderson et al (2002) for white-tail deer populations. The modified multiplexes consisted of eleven STR primers separated into two PCR panels determined by base pair (bps) size and fluorescent label color. The white-tailed deer STR panel utilized two primer mix cocktails, which were run through an EdgeBio filter cartridge. These cartridges are essential when working with in-house multiplexes as they remove any unincorporated fluorescent labels. Stacking of salts, which is a common problem associated with non-commercial multiplexes, is also diminished via the filter cartridge. The samples were then run on an ABI 3100 Avant genetic analyzer. Allele sizes were binned and exported to a computer spreadsheet. Complete and partial genetic profiles were identified and scored for each appendage bone fragment.

Although this study uses white-tail deer as an animal model, it impacts the forensic community by identifying if certain bones yield more DNA than others, especially after being burnt. Criminals often attempt to hide proof of the crime by burning evidence. Both wildlife and human homicide investigators will benefit from the results charred bone DNA analysis can give to their respective forensic inquiry. This study purports to demonstrate that nuclear DNA can be extracted from remains containing extremely degraded DNA and previously only typed for mitochondrial DNA sequencing. It also outlines the development of a microsatellite multiplex, which will be used as part of Duquesne University's service learning component. In this capacity, future students can assist Pennsylvania game commission officers on white-tail deer poaching cases, incorporating collection and documentation techniques learned in another two semester long course, Criminal Investigations.

Charred Bone, DNA, Accelerants

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