



## Physical Anthropology Section – 2008

### H64 Preservation of Skeletal Collections: The Viability of DNA Analysis After the Application of Chemical Preservative

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The goal of this presentation is to demonstrate that the application of instant glue or cyanoacrylate can help to prevent damage to teeth in skeletal collections without preventing subsequent DNA analysis.

This presentation will impact the forensic community by providing a way to help preserve essential skeletal collections for future study.

Skeletal collections are essential to forensic anthropologists and are used to establish criteria for the examination and identification of forensic skeletal cases. Vital information regarding population variation can be ascertained to determine biological guidelines regarding age, sex, stature and affinity. Reference collections therefore must be preserved for continued research and assessment.

The Department of Anthropology at The University of Tennessee, Knoxville houses modern skeletal collections containing roughly 700 individuals. These Forensic and Donated Skeletal Collections were initiated by Dr. Bill Bass in 1972 and 1981 respectively. Each year these collections are examined by researchers from around the world and have provided data to establish criteria for the identification and analysis of forensic skeletal cases. The importance of these collections and others like them is well documented in the hundreds of journal articles and scholarly presentations generated from the study of these curated skeletons. Unfortunately, because of the antiquity of some of the samples, preservation concerns have arisen. In particular, cracking and breaking of the teeth of older specimens has been observed.

Instant glue or cyanoacrylate can help to prevent damage and degradation of teeth in skulls that undergo a great deal of handling such as those in study and reference collections and like those used during facial reconstruction. While cyanoacrylate protects teeth from successive damage, it is unknown if its chemical presence will preclude other types of future analyses such as DNA testing. This project investigates the viability of subsequent DNA analysis from teeth after the application of cyanoacrylate for preservation.

The DNA from twelve teeth was examined. Six teeth were treated with cyanoacrylate and six teeth were untreated to serve as controls. Each set of extracted using a silica/guanidine thiocyanate extraction procedure. DNA was quantified by qPCR as well as gel electrophoresis. Mitochondrial DNA sequence analysis was performed for each of the teeth to examine the quality of DNA after treatment as well as to assess any potential contamination contributed by researchers. Strict controls were employed to preclude and detect external DNA contamination.

The quantity of DNA amplified from untreated samples was greater than the DNA from treated samples. Most likely a portion of the cyanoacrylate is not alleviated during the extraction process and carries over into PCR analysis and having an inhibitory effect on amplification. Although treated tooth samples had a diminished DNA quantity, all teeth were successfully analyzed. Mitochondrial DNA sequence analysis was possible from both untreated and treated teeth. Extraction and PCR blanks were void of signal and sequence data did not match that of any researchers involved in the study.

#### **Skeletal Preservation, DNA, Teeth**