E3 From 20 to 12 in 42 Years: A Case of Inflated Age Estimation and the Role of Forensic Anthropology in Cold Case Investigations

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After attending this presentation, attendees will have a better understanding of the forensic anthropologist's ability to redirect 40 years of investigative efforts through routine analysis of human remains.

This presentation will impact the forensic science community by illustrating the utility of forensic anthropology in cold case investigations involving human remains that would not have originally fallen under the auspice of the forensic anthropologist. In particular, this presentation demonstrates the practical value of traditional forensic anthropology in scenarios where DNA analysis may be of limited investigative significance.

In May 1972, partially decomposed human remains were located in a pond near Daytona Beach, FL. An autopsy indicated that the victim was a White male, approximately 20 years old, and determined the manner of death to be homicide. In an effort to not only identify the victim but also to locate any witnesses or suspects, the Volusia County Sheriff's Office (VCSO) pursued leads generated from this autopsy report and evidence found at the scene. They sought the help of the media in publicizing descriptive information regarding the decedent and the crime, as known at the time, in order to identify the victim; however, their investigative efforts failed to yield an identification. The subject was interred as a John Doe and added to the list of unsolved cold cases. Over the next four decades, law enforcement focused all further identification efforts on a specific subset of the population — young, adult White males.

In 2013, John Doe was exhumed in order to obtain a DNA sample for analysis as part of continuing efforts to identify the decedent. The University of Florida C.A. Pound Human Identification Laboratory (CAPHIL) assisted in the exhumation and further performed an anthropological examination not previously conducted. As the casket was opened on-scene, the decedent's ankle was exposed; the distal tibial and fibular epiphyses were open. It was immediately clear that the assumptions of the investigation were false; the remains were not those of an adult. The VCSO was immediately notified that their decedent was significantly younger than reported and the remains were transported back to the CAPHIL for extensive analysis.

The precise age of John Doe was assessed using extent of epiphyseal closure, long bone length, and degree of dental development. Additionally, both a non-ossifying fibroma and an osteochondroma, two distinct pathologies associated with actively growing subadults, were found. It was determined that the decedent was 11 to 14 years old, and most likely 12 to 13 years old, at the time of death. The result of this study was the most significant change to the case since its origin in 1972. The anthropological findings changed the dynamics of the crime itself and served to all but nullify the previous 40 years of investigative efforts by law enforcement well before the DNA results could even be submitted. Indeed, given the limited number of nuclear DNA comparative samples available as of 1972 and the taphonomic condition of the remains, the DNA may yield little novel information.

While advancements in the ability to extract and analyze DNA and the development of comparative DNA databanks have revolutionized the field of human identification and provided numerous invaluable identifications of decedents, DNA's role in cold cases that predate the Combined DNA Index System (CODIS) may be more limited. An extended postmortem interval and poor preservation of the remains may limit analysts' abilities to extract usable nuclear or mitochondrial DNA. Nuclear exemplars are likely unavailable; mitochondrial exemplars may likewise be limited and typically require a prospective identification for direct comparison. Even in the absence of a database match, DNA analysis may provide information about the biological sex and ancestry of the decedent, but cannot provide information regarding age-at-death or numerous other identifying characteristics (e.g., stature, idiosyncratic morphology, life history traits, etc.).

In summary, cold cases are routinely being reopened due to advances in DNA analysis; however, the original assumptions implicit to cold case investigations are not always correct and DNA is not always capable of correcting these errors. When investigative entities reopen cold cases, DNA analysis should be conducted, but the unique value of forensic anthropology — even for cases that underwent full autopsy — cannot be overlooked.

Anthropology, Cold Case, Age Estimation