



Physical Anthropology Section – 2004

H86 Air-Drying as a Means of Preservation for the Unidentified and Unclaimed Remains From the World Trade Center

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After attending this presentation, attendees will understand the method of air-drying preservation utilized for the unidentified and unclaimed remains from the collapse of the World Trade Center, its theory, and the rationale for its adoption.

Participants will come away from the presentation with the knowledge and understanding of the air-drying method of preservation used for the unidentified and unclaimed remains from the World Trade Center (WTC). This method of preservation has not been previously attempted.

This paper presents the air-drying process used for the preservation of the unidentified and unclaimed remains from the September 11th, 2001, collapse of the World Trade Center towers. The human remains held in storage at the Office of the Chief Medical Examiner (OCME) in Manhattan were preserved using a method of air-drying that has not been previously attempted. These remains will be included in the permanent memorial to be constructed at the WTC site. Because the status of unclaimed remains may change in the future, and of the possibility of further identifications, the remains within the memorial must be easily accessible. The air-drying process was adopted as the best way to preserve the remains for permanent storage while avoiding the problems associated with other options for preservation.

The remains recovered from the site of the WTC were subjected to numerous taphonomic processes. The incredible forces involved in the initial impacts of the aircraft, the resulting unchecked fires, the eventual collapse of the towers themselves, in addition to exposure to water used for fire suppression, resulted in remains exhibiting extreme fragmentation, commingling, contamination and various states of decomposition. The condition of the recovered remains has made the identification process both extremely difficult and time and resource-consuming. Many of the remains are unable to provide enough DNA to allow for identification. Some remains that yield significant amounts of DNA are unable to be identified because of unavailable reference samples. In addition, many of the identified remains are intentionally left unclaimed by families or because of legal reasons. The result is a large number of unidentified and unclaimed remains.

Three possible options were considered by the OCME for the preservation of the remains: freezing, chemical preservation, and drying. Freezing the remains was ruled out because it was deemed infeasible to maintain for the life of the monument. Formaldehyde, the best choice for chemical preservation, was undesirable because it is carcinogenic, has a strong odor, and degrades DNA. Drying of the remains was deemed the best option for a number of reasons. The removal of water reduces the weight of the remains, effectively halts decomposition (and its related offensive odors), and preserves DNA. The preservation of the DNA is important in the event the OCME has to resample the remains. Lastly, the environment needed to store the dried remains is relatively simple to maintain.

The drying process itself involves the placement of the remains in a specially designed room at a temperature of 150°F (66°C) and negligible humidity until the moisture is removed. 150°F was established as a temperature that, coupled with the dry environment, facilitated the rapid removal of moisture while minimizing further degradation of the specimen DNA.

The drying process was determined to be complete by using visual and physical inspection of the remains. Considerations were given to the portion of the body represented, elapsed time, and any taphonomic treatments that may have occurred (concrete dust, jet fuel, etc.). Upon completion of the drying process, the remains were sealed in airtight packages suitable for permanent storage.

When finished, the OCME will have successfully dried the over 14,000 unidentified and unclaimed remains from the World Trade Center. An assessment of the effect of the drying process on the genetic material held within the remains is currently underway, with details and results of the research to be published in the future.

Air-Drying/Dehydration, Decomposition, Preservation