A69 Skeletal Preparation Using a Modified Steam Kettle: A Fast, Easy, and Low-Maintenance Method for Processing Human Remains

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Learning Overview: After attending this presentation, attendees will understand the process of utilizing a steam kettle for skeletal preparation, including strategies that improve the final quality of skeletal remains and decrease overall handling and processing time, and will recognize the benefits of utilizing a modified steam kettle for skeletal preparation of human remains.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing a method for soft tissue removal developed at Western Michigan University Homer Stryker M.D. School of Medicine that improves the efficiency of processing human skeletal remains while decreasing the opportunity for damage to the skeletal remains.

The removal of soft tissue without damage to bone is an integral part of forensic anthropology, specifically in the analysis of skeletal anatomy and trauma. Forensic anthropologists assist with reconstruction of the biological profile, identification, and trauma assessment when examination of the soft tissue is no longer possible due to decomposition, thermal damage, or trauma. Typically, scalpels and other metal implements are used in the removal of soft tissues and disarticulation of the fleshed decedent before maceration. Crock-pots or pots heated over Bunsen burners are often used for warm water maceration with chemical agents, such as sodium carbonate, other detergents, ammonia, chlorine, and dish soaps to break down the proteins and fats. This process requires extensive disarticulation of the remains into small body segments to fit them in small maceration vessels. This prolongs the duration of disarticulation and increases the likelihood of creating processing artifacts such as cut marks to the skeletal elements and joints. Furthermore, if maceration is not appropriately monitored, burning of the skeletal material can occur, irreparably damaging the elements and potentially obscuring pre-existing trauma. Using a steam kettle with a basket insert allows large body segments, such as intact extremities and articulated head-torso-pelvis segments, to be placed directly on an elevated basket in the steam kettle. This method demonstrates the ability to easily macerate skeletal remains without the use of chemicals, minimizing the risk of damaging bone, and greatly reducing the amount of hands-on time spent disarticulating and subsequently cleaning the bones.

Study materials include 18 donors of the Western Michigan University Homer Stryker M.D. School of Medicine Body Donation Program who elected to be included in the Skeletal Research and Teaching Collection. The water temperature, steam kettle settings, and duration of maceration were recorded throughout each skeletal processing and were varied between donors to understand the impact on the quality of the skeletal remains. In addition, the length and type (cooler vs. freezer) of storage and the condition of the decedent were recorded to explore the impact of storage temperatures and durations on bone quality. Donors were macerated at water temperatures that varied between 40°C and 94°C. The duration of maceration varied between two and nine days. The conditions that produced the best bone quality were a maceration temperature of 90°C, with no temperature fluctuation, for a duration of two days.

The preparation of skeletal material for analysis by the removal of soft tissue is an important part of skeletal analysis in forensic anthropology. Forensic anthropologists should be cognizant of the advantages and disadvantages of the different methods of skeletal preparation in order to utilize the method that best suits their needs and decreases the likelihood of damaging bone. This method produces skeletal elements that are in excellent condition for analysis. This new approach to skeletal preparation will improve the efficiency and final disposition of the skeletal remains.

Forensic Anthropology, Skeletal Preparation, Forensic Science

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