H85 Conditions for Breaking Down Mummified Tissue and the Subsequent Implications for Time Since Death

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The goal of this presentation is to inform attendees of the methods and conditions favorable to soften mummified tissue for easy removal from bone.

This presentation will impact the forensic science community by demonstrating how the application of this technique will quicken and simplify the bone cleaning process for skeletal collections. Moreover, the findings from this project suggest that traditional time since death estimates may need to be adjusted based on the state of mummified remains.

As more decomposition facilities are launched across the nation, the need for establishing effective techniques for removing debris, tissue, and organic matter from skeletal remains increases. In order to run a successful facility, the director must maintain a delicate balance between incoming donations and those ready to be cleaned for curation. Mummified tissue has a tough texture, is challenging to remove, and slows the process of cleaning skeletons. Efforts to soften the tissue typically occur after the skeleton is removed from the outdoor environment and transferred to an indoor lab for cleaning. Attempts to remove tissue can include heating it in water and picking it off the bone. Unfortunately, these strategies still result in an increase in the time it takes to clean donations. Thus, the need for finding a more suitable means to remove this type of tissue is necessary to prevent a processing backlog. Based on observations of processing techniques, the most effective variables for softening mummified tissue are heat and moisture. This project involved testing a variety of variables, including heat and moisture, prior to the removal of the donation from an outdoor environment. As a result of the effectiveness of heat and moisture application in indoor lab procedures, the author expected these variables to play a similar role in the outdoor environment.

Over the course of one year, donations were observed at the Anthropological Research Facility (ARF) at University of Tennessee, Knoxville. Each donation was prescreened to ensure that at least one anatomical region (e.g., a hand, etc.) was mummified. After the donations were collected, they were placed into two bags: the inner bag was clear plastic (allowing for observations of changes in the tissue); and, the outer bag was a tan biohazard bag (to designate the nature of the contents). Observations of moisture, light, insects, and amount of soil were made at the time of placement into the bag and approximately every week until the remains were deemed suitable for processing or were

skeletal. Donations were placed in several locations at the ARF to provide differing amounts of exposure to the variables. Categorical statistics were applied to the data to isolate the most effective variables for breaking down the toughness of the tissue in the shortest amount of time.

The results of this project were consistent with the findings during processing; both light and moisture (in conjunction with one another) were significant variables in speeding up the decomposition process. Surprisingly, partial sun was the most effective amount of light, while both small and medium amounts of moisture were successful. This discovery is consistent with the hypothesis that both heat (as generated by the amount of light) and moisture are crucial elements for the decay of mummified tissue. Donations that are placed in bags in a location with partial sun and light to moderate moisture will break down the tough tissue in intervals between two weeks and two months, based on seasonality.

The purpose of this methodology is to ease the burden of the processing crew. Instead of spending weeks working on removing tissue from one mummified skeleton, the processing crew can focus on mostly skeletal remains that only require a few hours to clean. The mummified donations can be placed into bags with the optimal conditions listed above and left while the natural moisture and light break down the tissue. The implications for these findings extend beyond mere processing techniques; they are also significant for time since death estimations. Assessing individuals with tissue that appears mummified (discoloration, patches of toughness, etc.), except for a soft texture, should take into account the possibility of a longer postmortem interval than those remains that are mummified with a tough texture. This project demonstrates that softening of mummified tissue can occur after a body has mummified and been exposed to key environmental elements.

Mummification, Time Since Death, Decomposition

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