H78 Burning Observations of Decomposed Human Remains: Obscuring the Postmortem Interval

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After attending this presentation, attendees will be able to: 1) identify effects of heat to early, middle, and advanced stages of decomposing soft tissue; 2) compare and contrast features of the pugilistic posture between fresh and decomposed remains; 3) demonstrate characteristics used for recognizing burned remains of a decomposed body; and 4) define the hallmark decomposition stage when the pugilistic posture is compromised by degenerative tissue changes.

This presentation will define similarities and differences in how decomposed remains burn in an attempt to cremate human remains after death. Additionally, it will demonstrate how burning obscures the postmortem interval and why caution should be used when dealing with cases of intentional criminal incineration of human remains.

Intentional burning of human remains is often a secondary process done to obliterate physical evidence, personal identification, or evidence of trauma. Prolonged disposal may result from temporarily abandoning or purposely storing remains. This belated decision to destroy corporeal evidence by fire after days or months may also involve intentional removal to a location unassociated with the original crime scene. Complicating the investigation is the task of estimating the postmortem interval from decomposed and burned remains. Unless remains have been frozen or left in a cool environment they will experience some level of tissue breakdown from autolysis and decomposition processes. If the decision to incinerate remains takes days or weeks, then it is important to know if and how burning decomposed tissues produce discernible deviations from the expected burn patterns of fresher tissues. Currently only speculation exists regarding the effects burning on decomposed remains and its impact on the pugilistic posture, burn patterns to soft tissue and bone, and the signature differentiating immediate postmortem burning from delayed attempts to later destroy the body.

In an effort to better understand this process, burning simulations were conducted using portions of unembalmed human bodies from anatomical gift donations which were preserved as frozen specimens until removal for designated exposure times. For multiple studies cadaver materials were segregated into general anatomical groups according to type: heads, arms, and legs. At week long intervals specimens from each anatomical group were individually thawed and placed in plastic bins. The specimens were then left to decompose during the months of June and July with average daily temperatures ranging from 70-95 degrees F. The redundancy in the protocol created known times of postmortem environmental exposure and produced a reasonable range of early, middle, and late stages of decomposition.

After a representative range of decomposed material was generated for each anatomical group, each specimen was prepared for the burning process. Prior to burning, specimens were seriated according to intervals of decomposition (earliest to advanced stages), photographed, and had muscle tissue removed for histological analysis. Specimens were then separated and placed within the context of a low temperature radiant heat fire for photographic documentation of the burning sequence. Limbs of arms and legs were laid in fully extended positions to document changes in progressively decomposed tissues from the expected pugilistic posture. Photographic intervals captured variations in the rate and amount of muscular response to the effects of burning for each decompositional stage.

An independent series of specimens was allowed to progress to an advanced stage of decomposition to observe differences from the actions of anthrophagic insect activity, mummification, and features of preexisting trauma. One set of remains was allowed limited open access to insects to simulate exposed outdoor conditions. Another set was completely restricted by plastic and placed within a warm indoor environment to simulate secondary storage within an attic or shed. A third set was partially mummified in a dry indoor setting. Pre-existing ballistic trauma was created in a final set prior to decomposition and burning for the purpose of pattern analysis of soft tissue and bone.

This study relates the effects of heat to generalized decomposition stages and avoids specific time since death estimates due to regional climatic variations. Overall, morphological changes in early decomposing specimens were difficult to differentiate from the freshest control samples. During advanced stages of burning, middle to late stages of decomposition was indistinguishable from early stage specimens in terms of their ability to attain the pugilistic posture.

A photographic essay illustrating progressive stages of burning for decomposing tissue stages will be presented. In addition, information concerning the influences of alternative taphonomic conditions and the effects of preexisting trauma will be presented. This information will demonstrate how burning obscures the postmortem interval and interpretations of it should be approached with caution when dealing with cases of intentional criminal incineration of human remains.

Fire Investigation, Decomposition, Burned Bone

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