H30 Differential Decomposition Patterns in Charred Versus Un-Charred Remains

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The goal of this presentation is to provide attendees with a method for both recognizing differential decomposition patterns indicative of fire modification and estimating the postmortem interval in charred remains.

This presentation will impact the forensic science community by providing awareness concerning the process of decomposition in fire modified remains, and allowing for more accurate postmortem interval estimation in charred remains. The pattern of decomposition in fire modified remains will be discussed in order to provide a greater understanding of the taphonomy of burning and subsequent decomposition.

In recent years there has been a renewed interest in fire modification of human remains, focus has primarily centred on early soft tissue changes during a fire and the effect of fire modification on bone. There is a paucity of literature on the subsequent decomposition of fire modified remains. This study established a scale by which investigators may determine the postmortem interval (PMI) from the appearance of charred remains, using visual markers of decomposition. The scale is based on accumulated-degree days (ADD) for standardization and applicability across disparate geographic and environmental regions. Additionally, the unique pattern of decomposition in charred remains is proposed as a means by which investigators may distinguish areas exposed to the most intense levels of burning from those which sustained less intense fire damage.

For the purposes of this study, a total of forty eight pig carcasses (*Sus scrofa*) were designated to either a control group (N=24) or an experimental burn group (N=24). Experimental pigs were charred for approximately ten minutes using a propane blowtorch (at sustained temperatures between 985-1070 ºC) to Crow-Glassman Scale (CGS) levels 1 (for the head, neck and limbs) and 2 (for the torso) (Glassman and Crow, 1996). These levels have been associated with the term *charred* for the purposes of this study, as opposed to *burned*, which suggests more extensive muscle tissue damage. Decomposition was assessed visually every 50 ADD for all carcasses, with weights and pH

samples taken in subgroups (N=3) every 100 ADD for both charred and uncharred carcasses.

A Charred Body Scale (CBS) for decomposition, paralleling that of Megyesi *et al*. (2005), was created and visual observations utilized to score charred carcasses at 50 ADD intervals. Carcasses in the control group were scored using the Megyesi *et al*. (2005) scoring system at the same ADD interval. The total body scores (TBS) for the control group and the total charred body scores (TCBS) for the experimental group were statistically analyzed to determine whether a significant difference existed in the rate of decomposition between the two groups.

Preliminary results indicate that there is a slight but significant difference ($p<.001$) between the decomposition scores of charred and uncharred remains, due to charred remains passing through early stages of decomposition at a faster rate than uncharred remains. Field observations suggest that subsequent statistical analysis of the decomposition rate between the two treatments with regard to specific body regions (head and neck, torso or limbs) may uncover more pertinent trends.

Additionally, it has been shown that the *pattern* of decomposition was altered by the charring process. Regions of the body which received the most extensive fire damage decomposed prior to less burned areas. Thus for the purposes of this study, the torso (which was burned to CGS level 2) of the experimental group reached bone exposure long before either the head and neck or the limbs. In contrast, the head and neck region of the uncharred carcasses decomposed rapidly, whereas the skin and skeletal structures of the torso remained intact through the close of the experiment at 747 ADD.

Due to the altered body scores and pattern of decomposition in charred remains, traditional methods of estimating PMI are less than ideal in cases of fire modification. It is suggested that the Charred Body Scoring system be utilized as a more accurate and pertinent means of determining PMI in charred remains. In addition to this, understanding the differential pattern of decomposition in charred remains can aid investigators in reconstructing the events surrounding a body's exposure to fire, as areas of most extensive fire damage decompose at a markedly faster rate than those with lesser charring.

Charred Remains, Postmortem Interval, Accumulated Degree Days

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