



## Physical Anthropology Section – 2010

### H29 Taphonomic Patterns: Can Brush Fires Mimic the Natural Decomposition of Heavy Muscle Markers on Bone?

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After attending this presentation, attendees will understand that brush fires are capable of creating discoloration patterns similar to those which occur on human bones from the natural progression of decomposition. This will be evaluated using three stages of decomposition: fresh, advanced decomposition, and skeletonization.

This presentation will impact the forensic community by introducing ground breaking heat related skeletal trauma research that has not previously been evaluated. Although heat related skeletal trauma has been studied in house, crematorium, and car environments, it has rarely, been studied in outdoor environments and never examined in a maritime environment. This research will impact the forensic community by helping discern the stage of decomposition for burned human remains that were exposed to a brush fire. It will also contribute to the breadth of information available on the identification of heat related skeletal trauma and the interpretation of morphological color characterizations.

Brush fires in Nova Scotia typically occur from April to June. Rare, but still occurring, is that humans fall victim to brush fire injuries. These injuries may result in an individual's demise or mask their unique deposition, if deceased in an outdoor environment before exposure to a brush fire. This study evaluates: (1) whether or not brush fires create unique burn patterns at specific stages of decomposition; and, (2) whether the discoloration patterns on bone, from burning, mimic naturally decomposing muscle tissue on skeletal remains. Therefore, caution must be adopted in the interpretation of taphonomic processes in outdoor environments that are frequented by brush fires.

This project was conducted during the summer months, of June to September 2009, to isolate one Maritime season. Eight 50 kg pigs were used as the experimental specimen due to their similarity in weight ranges, percentages of fat content, and body hair texture to human cadavers. The pigs were placed into four paired groups for evaluation:

(1) control, non-burned pigs; (2) fresh, burned pig; (3) advanced decomposition, burned pigs; and (4) skeletonization, burned pigs. Each pig was secured and protected under a custom-made cage throughout the decomposition process. However, when the pigs were exposed to the simulated brush fires, the cages were removed for a brief period of time. To quantitatively determine the decomposition stages of the pigs, they were scored using Megyesi et al.'s (2005) method that was broken into three different anatomical areas. The control pair was allowed to proceed from fresh to skeletonization in an undisturbed manner, and once the optimum characteristics were observed in the other three groups

(fresh, advanced, and skeletonized) their cages were removed and they were exposed to simulated brush fires. The pigs were visited on a daily basis, at the same time, to keep decomposition data and photo documentation consistent. The local weather station was also consulted on a daily basis so that data pertaining to the minimum and maximum temperature and relative humidity, total precipitation, and wind speed was collected.

Once all four paired groupings reached the dry stage of skeletonization they were dry macerated to remove any remaining flesh that remained on the bone surfaces. This was to avoid disturbing or removing any discoloration patterns on the surface of the bone that may be otherwise damaged due to exposure to water or chemical treatment. Once prepared, the cleaned bones were observed for burn pattern analysis and characterized using a Munsell Color Chart for standardization of colors. Bones exposed to the simulated brush fires were compared to the taphonomic discolorations that occurred in the naturally decomposing, control, paired grouping. As well, surveyors (a forensic anthropologist and a forensic pathologist) then scored the discoloration patterns on a selection of various bones, anonymously, as either coming from a burned or natural decomposed pig.

Burn analysis revealed: (1) no significant burn pattern on skeletal remains that have been exposed to fire while at various stages of the decomposition: but, (2) that brush fires can mimic the natural decomposition patterning of heavy muscle markers on bone.

#### Brush Fires, Taphonomy, Decomposition