



## Physical Anthropology Section – 2009

### H114 From Scene to Seen: Post-Fire Taphonomic Changes Between the In Situ Context and the Medicolegal Examination of Burned Bodies

Elayne J. Pope, PhD\*, University of West Florida, Anthropology Department, 11000 University Parkway, Building 13, Pensacola, FL 72701

After attending this presentation, attendees will understand how the body's physical appearance changes from the *in situ* condition at the scene until its evaluation by the medicolegal examiner due to recovery, handling (fragmentation), and transportation.

This presentation will impact the forensic community by informing investigators about the physical changes that occur to fragile, burned human remains from the time of discovery, to recovery, to transportation, and to the medicolegal investigation (independent of the scene) of the physical condition of the burned human remains.

It is often taken for granted that the physical condition of the body examined at autopsy accurately represents how it first appeared at the scene – unaltered. This presentation shows how the body literally changes its physical appearance from the *in situ* condition of the untouched “scene” and demonstrates how its appearance becomes altered during recovery, handling (fragmentation), and transportation to the point when the body is later “seen” and evaluated by the medicolegal examiner.

Heat exposure transforms soft tissues and bone into charred, brittle, and fragmentary structures that break away from parts of the body during and especially after the fire. Experimental observation of human cadavers in fires shows that these fragile structures experienced further fragmentation and alteration of the body's appearance during normal field search and recovery of burned human remains. The processes of burning and the different variables of fire suppression, discovery, clearing/extraction, recovery, and transportation were observed and documented for 5 bodies in vehicles and 2 bodies in burn cells (furnished model rooms).

**Fire Suppression:** The different methods of fire suppression are: standard water jet stream, fogging, and natural extinguishment directly influenced the condition and appearance of the body after the fire. If the body is hit directly with a pressurized water jet stream from a fireman's hose, the fragments of soft tissue and bone become displaced around the body. Of equal importance is the displacement of debris that falls on top of and around the body, and collapse of supporting structures (furniture, flooring) where the body is positioned. Pressurized jet stream suppression caused greater fragmentation of the body and the surrounding environment, thus expanding the search area and disintegration of smaller elements from water saturation and drainage. The technique of fogging sends the same pressurized water through an aspirating nozzle, thus creating a shower effect of smaller water droplets and is less destructive to tissues of the body and the surrounding structural materials. Foam or detergent can be added, but produces a similar effect by minimizing the damage to the victim. However, the use of water suppression can have the potential to wash away trace evidence and alter delicate skeletal trauma and should be considered during the postmortem examination. Natural or self-extinguishment is where the fire dies out from lack of fuel, but keep in mind that the body is a fuel load and the body's fat can sustain a localized fire for hours, thus increasing the heat-related damage to the body.

**Search/Discovery:** Fire scenes are challenging since most materials are visually altered and camouflaged among the ash and debris, including burned human remains. For this reason, it may not be obvious that there is a victim present at the scene, particularly if they are buried under similar-looking debris. During the search, fragile remains may be walked over, crushed, and further fragmented before being discovered, or disturbed by initial removal of large furniture/objects and raking of

smoldering debris. Post-fire breaks are easily identified by the crisp and bright colors of the margins, as opposed to heat-related and traumatic fractures with more uniform coloration with adjoining cortical surfaces.

**Clearing and Extraction:** Before the body is even touched, the methods of access can cause further fragmentation. For vehicles, different techniques of opening the doors, trunk, and roof will cause debris to fall on the body and movement of fragile remains. Different power tools such as a reciprocating or circular saw causes vibration of the vehicle and body. Hydraulic slow cutting saws (jaws of life) cause less vibration and movement, but still jar the body. Access to the body requires that the door and trunk locks must be forcefully pried open, thus shifting the body's position. For structural fire scenes, most of the larger construction debris (roofing, ceiling, walls, etc) must be removed to gain access to the remains and likewise causes fragmentation of brittle burned human remains.

**Recovery:** The field recovery team may or may not have osteological training, thus the recovery may involve the selection of larger and identifiable parts, leaving smaller fragments and pieces of the victim at the scene. Even careful handling of charred and calcined bone can result in fragmentation, especially when the larger parts are lifted and moved from the *in situ* context onto a sheet or body bag. Dry screening (if possible) is the best way to collect smaller fragments of bone, thus insuring all of the evidence and parts of the victim are taken for postmortem examination.

**Transportation:** Movement and placement of fragile burned remains into a body bag is guaranteed to



## Physical Anthropology Section – 2009

---

cause fragmentation, especially if the body bag is not supported by a backboard or a rigid structure. Picking up the flexible body bag at 2 or 4 points and movement from the scene means that the body's weight can crush loose fragments and causes more fragmentation from handling as the remains are moved from the scene, loaded and removed from a transport vehicle, transferred to a secondary gurney or surface, and then opened for the postmortem examination. The thickness and rigidity of the plastic/fabric also should be considered as a contributing factor in pressing against the fragile remains, thus increasing fragmentation.

Often the bodies of fatal fire victims are examined independent of the fire scene. The investigator should be aware that the condition of fragile, burned human remains changes its visual appearance from the point of discovery to the postmortem examination (independent of the scene) when the body's physical condition is analyzed as evidence for the medicolegal examination of the victim's manner and cause of death. Examples will show the progressive stages and causes of fragmentation from the point of discovery to laboratory examination.

### **Fatal Fire, Burned Human Remains, Cremation**