

# HUMAN IDENTIFICATION

*Case Studies in*  
*- Forensic Anthropology -*

*Edited by*

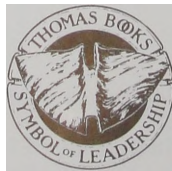
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## Chapter 13

# IS IT POSSIBLE TO CONSUME A BODY COMPLETELY IN A FIRE?

WILLIAM M. BASS

### INTRODUCTION

Forensic anthropologists are often asked, "Is it possible to consume a body completely in a house or building fire?" The answer is no. Even though no soft tissue may remain, there are always pieces of the skeleton, and if a careful search is made by well-trained osteologists, fragments of bones can be recovered and subsequently identified.

One of the earliest reports involving burned bone was the "Furnace Murder Case" in which Wilton M. Krogman (1949) experimentally burned human remains to document the changes that occur when a skeleton is burned in a furnace. Krogman was able to identify the fragmentary pieces of the skeleton that remained as human and diagnosed some features of the individual. Although reports on burned bone are scattered in the literature, a good summary can be found in Stewart (1979). Early research on archaeological cremations (Adena and Hopewell Cultures) was done by Baby (1954), and more recent experiments have provided empirical evidence of bone burned under controlled conditions (Binford 1963, 1972; Buikstra and Goldstein 1973; Thurman and Willmore 1981). Other useful information on cremations has been reported by Gejvall (1963), Herrmann (1977), Merbs (1967), and Wells (1960).

Even when bodies are commercially cremated, the skeletal fragments can be identified if they are not ground too finely. Most people do not realize that a cremated adult human body produces approximately a half bushel or more of fragments and ashes. Usually only a small portion of the ashes is returned to the family in an urn while the major portion of the bony remains is ground and disposed of in various ways. Maples (1982) reported the analysis of a commercial cremation involved in a forensic case.

**SPECIAL PROBLEMS**

The aid of the forensic anthropologist is usually requested in cases where the body is extensively burned. I have previously reported on the special contributions of a forensic anthropologist in fire investigations (1979), and more recently Angel (1982), Rhine (1982), and Suchey (1982) have reported on the identification of burned bone. We, as forensic anthropologists, are seldom needed in cases involving death by smoke inhalation or in analyzing bodies on which much of the tissue remains. Burned bodies often assume the so-called pugilistic pose. As illustrated in Figure 13-1, this is a typical boxer's posture with the arms drawn up and the fists clenched in a defensive position. It is caused by heat coagulation and shrinkage of muscle bundles, predominately the stronger flexor muscles. Watanabe (1968:139) states, "This change can occur in bodies that are alive or dead and is only an indication of exposure to intense heat." In a hot fire the arms and legs usually burn and fall from the body, and the skull explodes because of the rapid expansion of fluids within the brain. Thus, the typical burned case seen by most forensic anthropologists consists of the torso (and if even more extensively burned, only the pelvic area) or a skeleton completely reduced to bone fragments and ashes.

It should be remembered that in burn cases where only the torso or pelvic area has been recovered (usually by the rescue squad or fire department), the best evidence for a positive identification still remains at the scene of the fire in the form of burned bone fragments of the skull and limb bones. Care should always be taken to search the fire scene for teeth, cranial fragments, dentures, orthodontic and orthopedic devices, jewelry, and items contained in or on the clothing worn by the victim.

**ILLUSTRATING CASES****Case 1**

A few years ago I was asked to identify some burned bones that had been identified by a physician and a forensic pathologist as being those of a dog. I first saw the material about 12 days after the fire. The bones submitted consisted of the fragmentary pelvis, the lower lumbar vertebrae, and about 4 inches of the proximal portions of both femora of a human male of approximately 38 years. The bones were held together by burned tissue. Age was based on an assessment of the pubic symphysis. Realizing that the fragmentary skull probably was still at the scene of the fire, I asked the sheriff if we could return to the burned house and search for teeth and bone from which



Figure 13-1. A good example of the pugilistic pose. This adult male fell into a brush fire. Note the typical boxer's posture, caused by contraction and shrinkage of muscle bundles, predominately the stronger flexer muscles.

we could make an estimation of race and, I hoped, a positive identification. Arrangements were made, and when we arrived, the sheriff took me aside and said the individual suspected to have burned to death in the fire always carried a .32 caliber pistol and always wore blue jeans. Even though we visited the fire scene some five weeks after the fire, we were able, through a careful search by well-trained osteologists using systematic archaeological techniques, to discover much new information. We found (1) the .32 caliber pistol near where the torso was recovered, (2) the type of metal rivets often found in blue jeans, (3) enough teeth and cranial fragments to make a positive identification through comparative records, and (4) enough evidence to prove the house fire was arson. Though there was a deceased suspect in this case, it was important to make a positive identification of the body or bodies, because there could be other possible victims of the fire. Therefore, we carefully excavated the entire house. Aside from the skeletal remains and items mentioned above, we also recovered three charcoal lighter cans on which labels were still legible (no charcoal grill was present). There were no coat hangers in the closets, no dishes or silverware in the

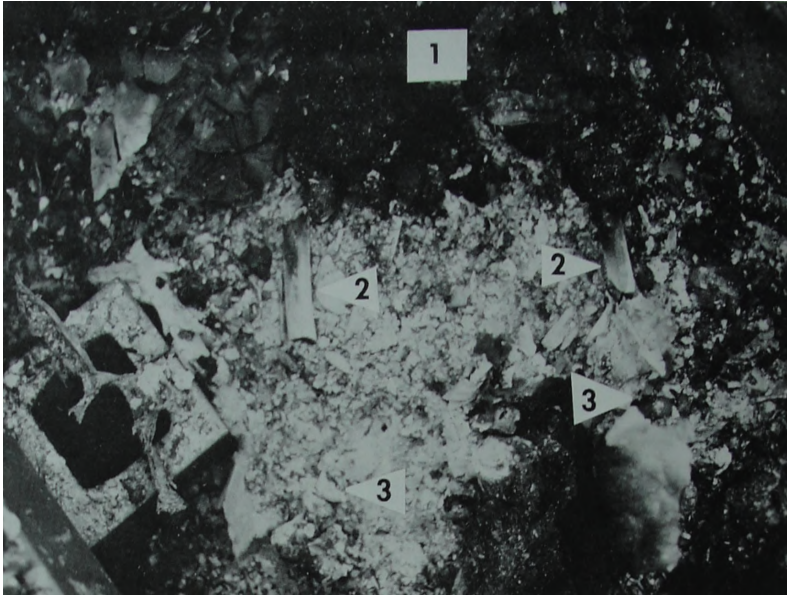


Figure 13-2. Because the legs and arms are smaller and surrounded by air, they usually burn to a greater degree than the torso. Above, the badly charred pelvis (1) is in the upper center of the picture. The proximal 4 to 6 inches of the femora can be seen (2) where the soft tissue has been burned away. The distal portions of the femora and the rest of the legs have been reduced to bone fragments, which can be recovered by careful excavation (3).

kitchen, and no furniture in the house at the time of the fire. It was obvious from our investigation that all items of value had been removed from the house prior to the fire. This illustrates that fire scenes contain much evidence even long after the fire, and much can be recovered for interpretation by using careful archaeological techniques.

### Case 2

Another case illustrating how much information a forensic anthropologist can retrieve occurred in mid January of 1981 in Hawkins County, Tennessee. The sheriff's office called one Friday to request aid in locating a missing person, a 36-year-old male, who had been missing some 12 days and possibly could be in a house that recently burned. I arrived at the scene around 9:00 Saturday morning, along with three graduate students experienced in osteology and forensic anthropology.

The two-story brick home was on the outskirts of Kingsport, Tennessee,

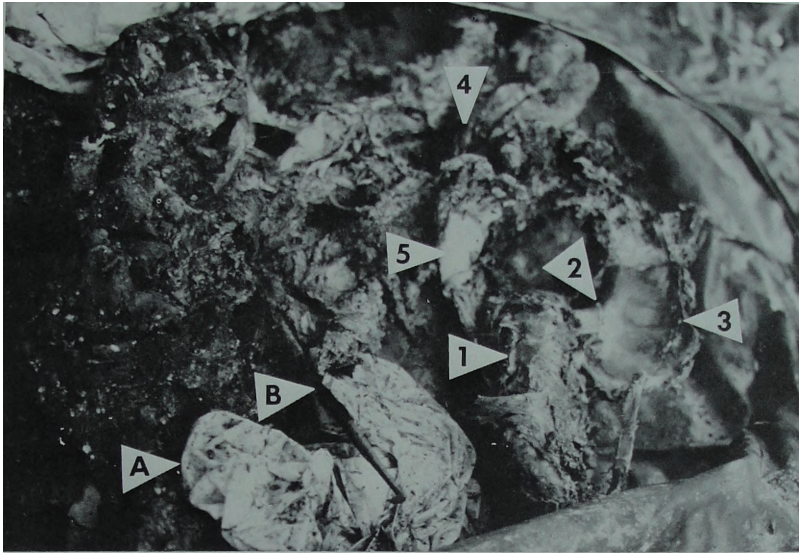


Figure 13-3. At first glance, this material recovered from a fire and submitted for identification appears to be of amorphous character. The above picture is the first view of material in a disaster bag, much of which is partially burned. The nonhuman material is (A) a sheet and (B) a stick. The human material is (1) lower lumbar vertebra covered by burned tissue, (2) right sacroiliac joint, (3) right ilium, (4) proximal portion of the left femur, and (5) remaining portion of the burned left ilium.

about 100 yards south of the Holston River and approximately 500 yards from its nearest neighbor. The sheriff related the following story. The house had recently been purchased by a Virginia man (J.G.) who was in the process of remodeling it. He usually spent the week working on the house with the help of a locally hired man and returned to Virginia on the weekends. One weekend the owner of the house did not return to Virginia, and by Sunday his family contacted the Hawkins County Sheriff's Office. A check was made, and for the first time the officials were aware that the house had burned. They had not been notified of the fire even though subsequent investigation in the neighborhood revealed that an explosion had preceded the fire.

The fire department had not been called, and the house was a total loss. Only the lower portion of the brick walls remained. Two large brick chimneys as well as part of the walls had fallen inside the structure. Because the house was being remodeled, no furniture was present to indicate the location of bedrooms. Our interview with the police revealed that the new owner had

been sleeping in a sleeping bag on a wooden cot at one end of the house. Our forensic excavation was begun in that area.

An hour after we began, we discovered human foot bones. Further intensive search revealed an extensively burned skeleton with no soft tissue remaining. A small portion of the left buttock was found adhering to the floor, but not enough tissue remained to obtain a blood sample. The skeletal material recovered was similar to what is left from a commercial cremation, i.e. small charred or calcined fragments.

Careful excavation revealed that when the fire started the body was unnaturally contracted and lying on its back. The legs were folded back on top of the body with the femora on top of the thoracic region and the feet in the head area. A major complication, however, was that no skull or upper limb bones were present. This case was entirely different from the pugilistic pose discussed earlier. The pugilistic position can only be determined when the arms are still attached to the body. In the present case little tissue remained, and the entire skeleton was cremated. Even though cremated, the unnatural anatomical position of the thorax, pelvis, and legs suggested some unusual circumstances surrounding the death of J.G. Concentrated examination of the thorax, pelvis, and legs allowed us to prove that the body was in the basement when the fire started and had not fallen through from an upper floor. There was no debris between the skeleton and the concrete floor. Had the body fallen through from an upper floor, debris and burned particles would have been between the skeleton and the concrete basement floor.

In addition, the fire had been so hot that the body had cooked onto the basement floor. The left buttock (which had been reduced to a cinder) was removed. A small unburned portion of jockey shorts and dark green work pants lay immediately on top of the concrete floor. Three inches to the left of the fragmented spinal column was a chunk of lead (possibly a bullet) with an impression of fabric on the side next to the floor. The ribs had burned to ashes, so it was impossible to state definitely that the individual had been shot, but the proximity of the bullet to the spinal column and the fabric impression suggested such an event.

Numerous photographs were taken of every phase of excavation and recovery. After removal of the lower portion of the skeleton, the excavation was expanded, and the fragmented skull and upper arms were found about 8 feet south of the postcranial skeleton. We were able to collect most of the teeth and cranial bones as well as the bones of the upper limbs even though they were in hundreds of pieces. We were, again, able to show that the body lay on the basement floor prior to the fire and had not fallen from the floor above.

The field recovery being completed and the lead slug turned over to the





Figure 13-4. Graduate students in forensic anthropology are conducting a careful excavation of a two-story house that has burned a few months before. An elderly woman who lived in the house could not be found after the fire. The forensic excavation revealed no evidence of the woman, suggesting that she was not in the house at the time of the fire.

police for ballistics tests, we returned to the laboratory for the long and careful reconstruction of the face and dental regions from the small fragments. It was known that the suspect, J.G., had extensive dental work, and records from his dentist were obtained by the time we had pieced together the facial skeleton. Radiographs of the recovered burned material revealed a sufficient number of similar traits for positive identification. The missing person, J.G., was indeed the victim recovered from the fire.

### *Disposition of Case*

Why had the skull and upper limb bones separated from the rest of the body? Had this body been blown up? The neighbors had reported an explosion prior to the fire. I had no previous experiences with explosions, and the extensive fragmentation of the entire skeleton did not allow much insight, since fragmentation and disintegration to ashes do occur in fires this hot.

After our recovery and positive identification, the law enforcement officers began an extensive investigation, which led to the arrest of the man

hired to help in the remodeling. A court trial was held in October of 1981, and the defendant was found guilty and sentenced to die in the electric chair. Court testimony helped fill in some of the missing details.

J.G. had been shot and robbed. His truck and some of the materials purchased for the remodeling were sold. Two dogs were brought into the house to destroy the body. When that did not occur after a day, a decision was made to blow up the body and burn the house to cover up the murder. In this case, I suspect, both the explosion and the very hot fire contributed to fragmentation of the skull and arms. Certainly the explosion caused the unnatural anatomical position of the thorax, pelvis and lower limbs and their separation from the head and arms.

This fragmentary skeleton would not have been found and the subsequent interpretation could not have been made without the training and expertise of a forensic anthropologist. Thus, with careful investigation by trained experts we can answer the question proposed as the title of this chapter—in the average house or building fire, it is not possible to burn a skeleton completely beyond recognition!

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