

IDENTIFICATION OF HATCHET TOOLMARKS IN HUMAN SKULL BONE

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Abstract

Identification of hatchet toolmarks in human skull bone was accomplished by use of **Labstone**, a dental gypsum material. Reference toolmarks were produced in the Labstone material with excellent results. This material is used for casting of tire and shoe impressions at crime scenes.

On August 14, 1995, four (4) white males stabbed and chopped to death one (1) white male while he was sleeping in his automobile near Gulf Breeze, Florida. These individuals stole the victim's automobile and pushed his body out of the car onto the street. The body had numerous chop and stab wounds in the head and neck area and was found lying face down on a residential street. The four (4) males were later apprehended near Coldwater, Michigan. These males had discarded bloody clothing, one (1) knife and a hatchet near a river bank between Pensacola, Florida and Mobile, Alabama.

Two (2) pieces of human skull bone from the victim and one (1) hatchet found near the river were submitted to the Pensacola Regional Crime Laboratory for comparison. One (1) piece of human skull bone had three (3) chop impressions consistent with a hatchet or similar type tool, but each had insufficient individual striation characteristics for identification. The other piece of skull had one (1) chop impression with identifiable toolmarks (Figures 1 - 2). This impression was cast using Mikrosil casting material.

A series of test chops using the questionable hatchet (Figure 3) were produced in a gypsum material, brand name **Labstone**. This material was selected for the test cuts because soap bars were found to be too soft, lead did not have the same consistency of the piece of skull and **Dip-pak** would not be available in time for the trial. [1 - 3] The **Labstone** material is used routinely at crime scenes to cast shoe and tire impressions and was available at the laboratory. Once this material had dried and set, it was found to have similar consistency with human bone; somewhat porous and hard.

The gypsum material is prepared by adding 100 grams to 30 ml of water. The material may be mixed by adding the powder to water in a plastic container until the mixture has a consistency similar to thin pancake batter. This mixture is allowed to set for approximately 15 - 20 minutes. Any excess water may be decanted from the container at that time. Once dried, the cast is suitable for reference testing. Reference cuts using the hatchet were produced into the gypsum cast at various angles, between 10 and 90 degrees. These reference cuts were then casted using Mikrosil.

The Mikrosil casts were compared using a comparison microscope with excellent results. Figure 4 is a photomicrograph of part of the toolmark identification. The test cast in the photograph of Figure 4 was produced along an edge of the hatchet blade approximately 0.25 inches long. The complete toolmark identification was made along the lower edge of the hatchet blade approximately one (1) inch in length. This reference cut was produced at an angle of approximately 80 degrees.

Toolmark identification testimony was presented in two (2) separate State trials involving three (3) of the four (4) defendants. All three (3) defendants were found guilty and sentenced to life in prison without parole. The fourth defendant had previously pled to 2nd degree murder and was sentenced to twenty years in state prison; serving at least 80% of the sentence.

Gypsum is a hydrated calcium sulfate substance, and bone consists of calcium salts in an intercellular substance. [4] This accounts for the similarity of the two (2) substances. **Dip-Pak** consists of a cellulose, acetate and butyrate thermoplastic mixture which is rubbery and flexible. [5] **Dip-Pak** is not similar to human bones due to the chemical structure of the material; however, this material has been used by many firearm examiners and myself with successful results comparing toolmarks. The **Labstone** material has a consistency more similar to human bone than the **Dip-Pak** material in both physical properties of hardness and flexibility.

The **Labstone** material is slightly softer than human bone that makes it an ideal substance to produce reference tests when making toolmark examinations. The gypsum material may also be used in other sections of the crime laboratory for casting impressions at crime scenes. The cost of this material is much less than that of **Dip-Pak** and along with its versatile use in the crime laboratory makes it a most suitable reference test material for toolmark comparisons of bone and cartilage.

Ordering information for this product is listed below. The price of this material as of February 1997 was \$18.75 per 25 pounds.

Labstone (buff)

Sullivan Dental Products
10920 W Lincoln Avenue
West Allis, Wisconsin 53227

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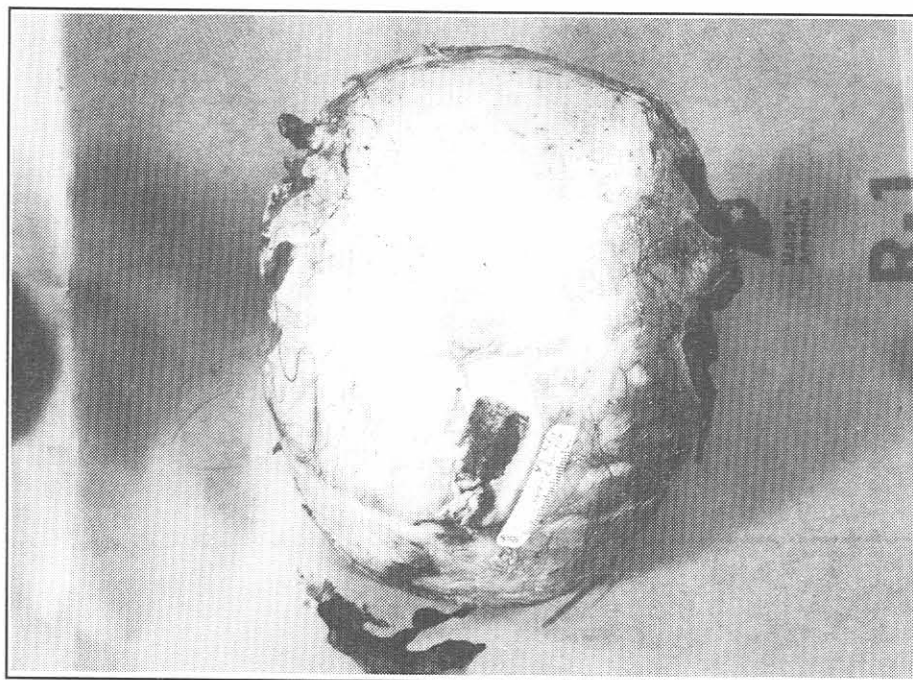


Figure 1- *Hatchet chop impression in piece of skull.*

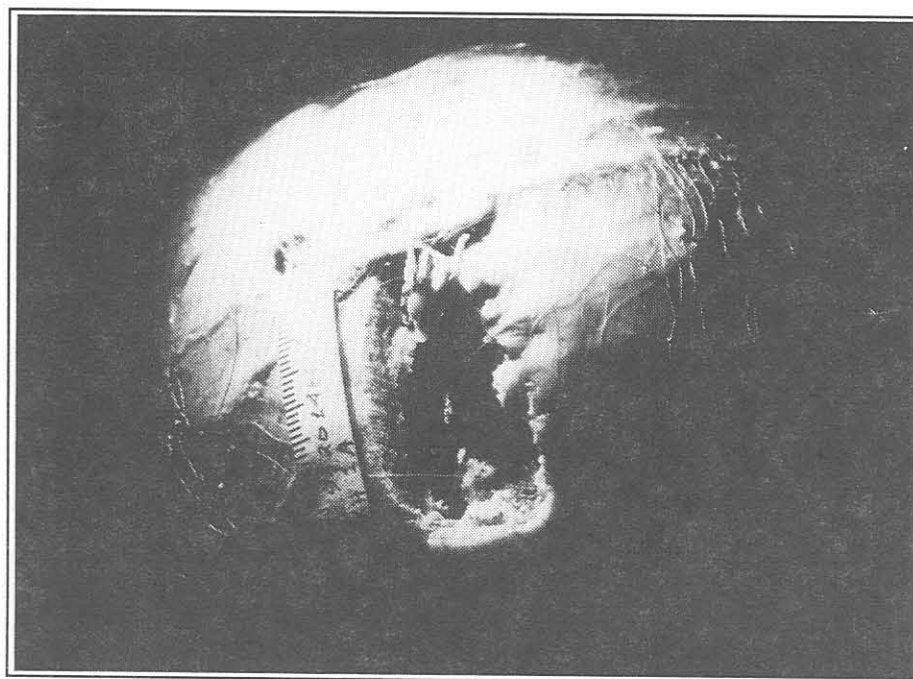


Figure 2- *Toolmarks in chop impression.*

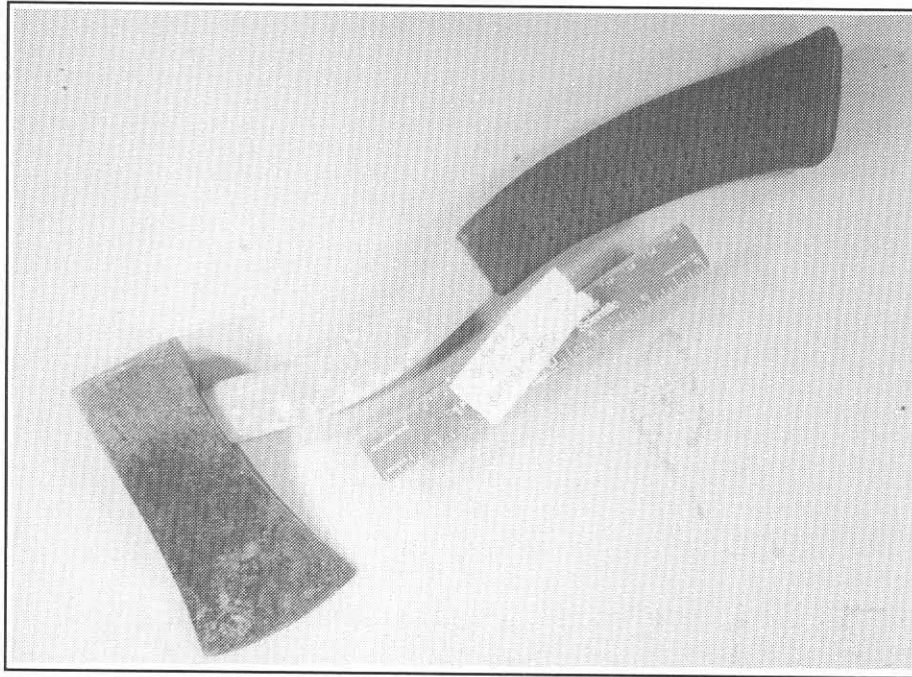


Figure 3- *Hatchet found near a river in Alabama.*

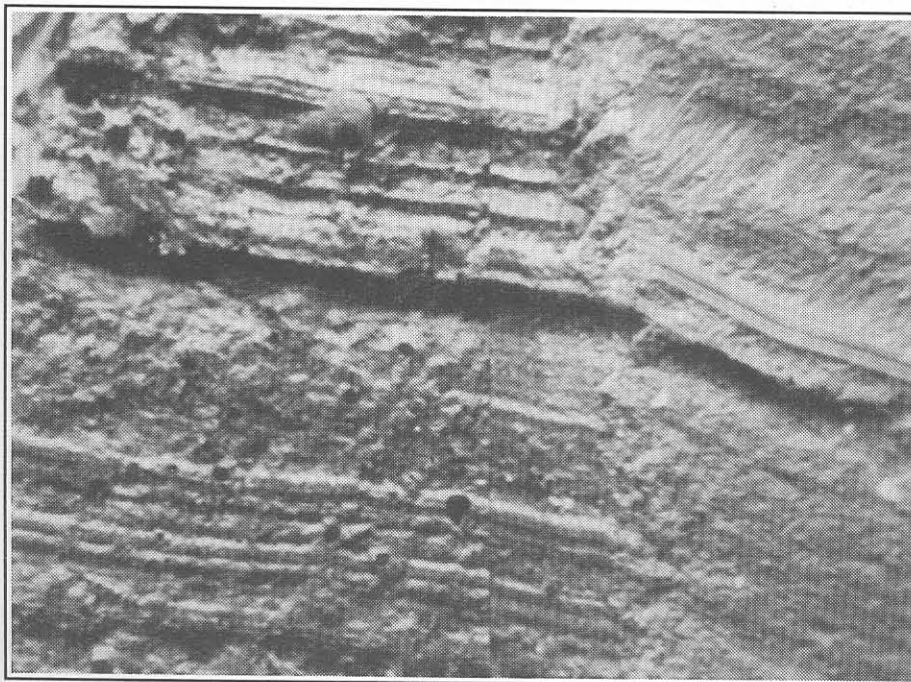


Figure 4- *Photomicrograph of toolmark identification.*