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Original Article

Using a Killer's Statements as Critical Evidence to Support a Charge of Third-Degree Murder (as Opposed to Self-Defense) When Physical Evidence is Inconclusive: A Case Report

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Abstract

In a conversation over a few beers, a killer bragged to a witness that seven years earlier he had shot a man and buried the body. The witness reported the conversation to the Pennsylvania State Police. This admission was later caught on tape in a police-sting operation. The killer reluctantly cooperated with the police, taking them to the burial site while insisting that the crime was self-defense. A statement made by the killer that he shot the victim in the head and *the victim began screaming loudly* so he shot him again in the head to quiet him is physiologically impossible by all accounts, proving murder.

Keywords: Abstract evidence; Concentric fracturing; FORDISC 3.1; Forensic stature; Manner of death; Nonmetrics traits; Postcranial bones; Projectile trauma; Radiating fractures; Wound track

Introduction

In May 2006, in a conversation over a few beers, a killer bragged to a witness that five years earlier (in 2001) he had shot a man and buried the body. Troubled by this conversation, the witness alerted the Pennsylvania State Police. With only a missing-persons report and no physical evidence of a crime, the state police was powerless to make an arrest. However, if an admission could be caught on tape, then the state police would have enough evidence for an arrest. Subsequently, a sting was set up by the state police, where the witness, taping the conversation with a recording device concealed under his clothing, would coax the killer into telling his grisly tale a second time.

Unaware that law enforcement was monitoring the conversation, the killer bragged again about killing a man five years earlier and disposing of the body. In 2008 (returning to Pennsylvania after two years away) the killer was arrested and charged with an open count of murder, which includes first-degree, second-degree, and third-degree murder, voluntary manslaughter, and involuntary manslaughter [1]. At first the killer did not cooperate with state police detectives. However, after consultation with his attorney and some family members, he changed his mind and adopted a self-defense strategy. Self-defense (even though he concealed this crime) would get him a five-year maximum prison sentence (the killer was 45 years old in 2008), as opposed to a life sentence if he were convicted of first- or second-degree murder [2].

Secured in handcuffs and leg-irons, the killer-from memory-took the state police to a wooded area near his hunting club where he had buried the body. This area was actually the second burial site (Figure 1). According to the affidavit, the killer told state police detectives that he had initially buried the victim [2001] in a shallow grave but had returned there a few days later to dismember the body because he felt anxious [3]. A few years later (2005), he returned to the original burial site and moved the bones to the second burial site. Without providing any details, the killer stated that some of the skeletal elements went missing when he exhumed and then reburied the remains in 2005. He did not volunteer any information on the specific bone elements that were missing or the percentage of skeleton remaining. But he did state that he reburied the remaining bones in a posthole and then covered the hole with a large rock. He also stated that he shot the victim with a Beretta 9mm caliber hand gun. The biological anthropologist was not present when the site was found or during the recovery of the remains in 2008.

Figure 1: The area marked by the red pin flag noted as the 'second burial site' by the killer.

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When the large rock was removed, Pennsylvania State Police CSI recovered fragmented cranial and postcranial skeletal elements as well as the victim's clothing from the area identified by the killer (Figure 2a-b). Despite a ground-water problem, material evidence and bones were also recovered. After the recovery was completed by the CSI unit, many skeletal elements and fired projectiles were still missing (Figure 3). In fact, the clavicles, scapula, sternum, vertebrae, pelvis, most ribs, and fired bullets/cartridge cases were never recovered. The primary burial site was never found. The bones were taken to the Monroe County coroner's office, and a few days later, the biological anthropologist was consulted. Cleaning and reconstruction of the cranial and postcranial bones were attempted at the coroner's office without much success. Eventually, the biological anthropologist took possession of the skeletal remains in 2008 for further cleaning and reconstruction at Bloomsburg University Department of Anthropology (currently reorganized as Department of Anthropology, Criminal Justice and Sociology, Commonwealth University of Pennsylvania).

a. b.

Figure 2a-b: Recovery area showing ground water and victims boots.

Figure 3: Recovered human and material remains: Thick arrows show cranial fragments; thin arrows show fragmented long bones and clothing.

In one of the numerous state police interviews that followed after the killer's arrest and recovery of the victim's remains, the killer stated that he had had a minor dispute with the victim and suggested that they should have a private conversation. He took the victim to an area near a hunting club where the killer was a member [4]. He insisted that the victim attacked him and that he had no choice but to defend himself by shooting the victim twice in the head. The killer made the following statement in an April 2008 affidavit: "*I shot him in the head and then he started screaming loud, then I shot him again in the head just to shut him up*…" [5]. For several reasons that will become obvious later, this statement was the critical factor in determining that the shooting could not have been self-defense.

Materials and Methods

Case report (N06-0616191)

Cranial and postcranial reconstruction: biological profile (skeletal analysis)

In 2008, the isolated cranial elements were reconstructed using Duco cement glue and wooden skewers (Figure 4a-b). The cranial bones that were present included three large fragments of the frontal bone; two large and one smaller fragment of the right and left parietal bones; two nasal bones joined at the inter-nasal suture; one large occipital fragment with partial right superior nuchal line, jugular notch, and lambdoidal suture; and left and right maxilla with nasal aperture. The right maxillary and malar bones are intact, but the left malar, left maxillary bone (a large portion of it), and left orbital margin are all missing. A small fragment of the endocranium was also recovered (Figure 5). This fragment consisted of two different bone elements: a small portion of the frontal bone and the optic-canal portion of the lesser wing of the sphenoid. When all of the recovered bones were conjoined, the result was a 20 percent skeleton (Figure 5).

a. b.

Figure 4a-b: a) Left profile view of cranium with yellow arrows showing concentric fracturing and plates of bone pushed outward: Thin arrows show high nasal angle, large nasal spine, large brow; b) triangular nasal opening.

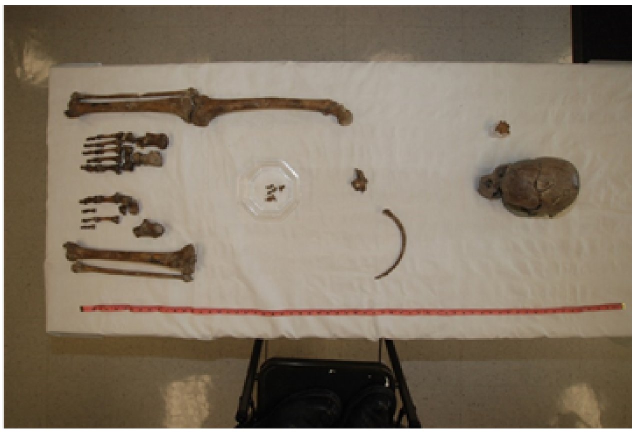

Figure 5: Layout of the skeletal remains after conjoining skeletal fragments resulting in a 20% skeleton. Top left near cranium: Partial frontal bone and optical canal portion of sphenoid; Lower center in plastic container: Unidentifiable bone fragments.

The cervical, thoracic, and lumbar vertebrae were all missing. In addition, the clavicles, scapula, sternum, ribs, and pelvis were missing. The left 9th rib and a small portion of the sacrum were recovered (Figure 5). The fragmented leg bones present include the right and left tibiae and fibulae, and the right femur. They were all broken at midshaft. All of the other long bones were missing (Figure 5).

Most of the right tarsal, metatarsal, and phalanges were present. The second distal phalange was missing. On the left foot, only the calcaneus; navicular; 1st cuneiform; 2nd cuneiform; 1st metatarsal; 3rd metatarsal; 1st proximal and distal phalanges; and 2nd and 4th proximal, intermediate, and distal phalanges were present (Figure 5).

Ancestry, sex, and stature

A forensic dentist positively identified the victim by comparing radiographs of the isolated maxilla with radiographs from his antemortem/premortem dental records. Despite this fact, the biological anthropologist needed to make sure that the remaining isolated cranial and postcranial remains did in fact belong to the same victim. Subsequently, ancestry, sex, and stature were assessed.

Extensive damage to the cranium precluded any craniofacial metrics. Therefore, nonmetrics were used to assess ancestry and sex. Based on the high nasal angle, triangular nasal opening, large nasal spine, narrow nasal root, large brow and general robustness of the cranium, this individual was determined to be a male of European ancestry, or a male *Caucasian* (Figure 4a-b) [6, 7]. The horizontal diameter of the femur head (an accurate vertical diameter could not be measured because of damage) was 45 mm. This is in the range of a small male [8].

After the long bones were conjoined, measurements in millimeters (mm)-described in (Table 1) and (Figure 6a-d)-were obtained from the long bones available (Table 2). Only measurements from the right femur, right tibia (less damage), left tibia (less damage), and calcaneus were analyzed by FORDISC 3.0 Computer Program in 2008. FORDISC is a computer program designed to classify unknown human skeletal material by providing estimates of ancestry, sex, and stature based on measurements of these skeletal materials [9]. To get an up-to-date stature estimation, the measurements were computed again using the current version (FORDISC 3.1) of the computer program which factors in minimum and maximum birth years. Using White males as a reference group (because the victim's family and friends identified him as a White male) born between 1963 and 1965, the predicted forensic stature generated by FORDISC was 159.6 to 175.8cm or 5 feet 3 inches to 5 feet 9 inches (Figure 7).

Bone	Measurement	Description
Femur	Maximum length **(Max. Ln.)**	Distance from the most superior point on the head of the femur to the most inferior point on distal condyles. [1]
Femur	Bicondylar length **(Bicon. Ln.)**	Distance from the most superior point on the head of femur to the distal condyles where both condyles are firmly touching the end-board of measuring board. [2]
Femur	Epicondylar breadth **(Epic Br.)**	Distance between the two laterally projecting points on the epicondyles. [3]
Femur	Maximum head diameter **(Max. Head. Diam.)**	Maximum diameter of the head of femur (horizontal). [4]
Femur	Anterior-posterior subtrochanteric diameter **(A-P Subt. Diam.)**	Distance between the anterior and posterior surfaces at the proximal end of the diaphysis. [5]
Femur	Medial-lateral subtrochanteric diameter **(M-L Subt. Diam.)**	Distance between the medial and lateral surfaces at the proximal end of the diaphysis at the point of its greatest lateral expansion. [6]
Tibia	Maximum length **(Cond. Mal. Ln.)**	Distance from the tip of the medial malleolus to the superior articular surface of the lateral condyle. [7]
Tibia	Maximum proximal epiphyseal breadth **(Max. P. Epi. Br.)**	Maximum distance between the two most laterally projecting points on the medial and lateral condyles of the proximal articular region. [8]
Tibia	Maximum distal epiphyseal breadth **(Dist. Br.)**	Maximum distance between the two most laterally projecting points on the medal malleolus and the lateral surfaces of the distal articular region. [9]
Tibia	Maximum diameter at nutrient foramen **(Max. NF Diam.)**	Distance between the anterior crest and the posterior surface at the level of the nutrient foramen. [10]
Tibia	Medial-lateral breadth at nutrient foramen **(M-L NF Diam.)**	Distance at the interosseous crest at the level of the nutrient foramen. [11]
Fibula	Maximum length **(Max. Ln.)**	Maximum distance between the most superior point on the fibula head and the most inferior point on the lateral malleolus. [12]
Fibula	Maximum diameter at midshaft **(Mid. Diam.)**	Maximum distance at midshaft. [13]
Calcaneus	Maximum length **(Max. Ln.)**	Distance between the most posteriorly projecting point on the tuberosity and the most anterior point on the superior margin of the articular facet for the cuboid. [14]
Calcaneus	Middle breadth **(Middle Br.)**	Distance between the most laterally projecting point on the dorsal articular facet and the most medial on the sustentaculum tali. [15]

Table 1: Femur, tibia, fibula, and calcaneus measurements used in FORDISC 3.1 listed by bone, abbreviation/measurement, and brief description. (Adapted from Buikstra and Ubelaker 1994). [1] #60; [2] #61; [3] #62; [4] #63; [5] #64; [6] #65; [7] #69; [8] #70; [9] #71; [10] #72; [11] #73; [12] #75; [13] #76; [14] #77; [15] #78

Right Femur(mm)	**Right Tibia(mm**	**Right Tibia(mm)**	**Right Calcaneus(mm)**
Max. Ln. 436	Cond-Mal. Ln 366	Max. Ln. 356	Max. Ln. 86
Bicon. Ln. 434	Max. P. Epi. Br. 81	Min. Diam. 14	Middle Br. 43
Epic. Br. 87	Dist. Br. 50		
Max. Head. Diam. 45	Max. NF Diam. 34		
A-P Subt. Diam. 29	M-L NF Diam. 26		
M-L Subt. Diam. 28			

Table 2: Measurements of conjoined long bones used in estimation of stature.

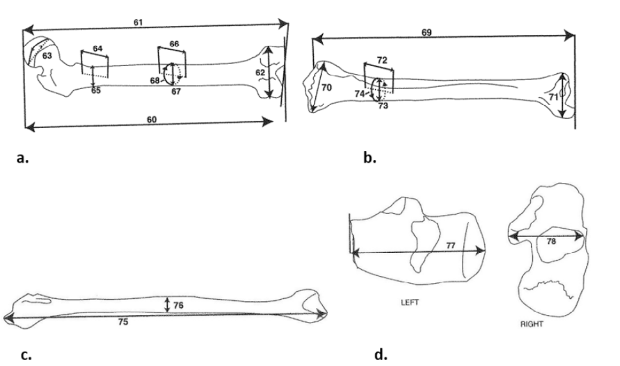

Figure 6a-d: Measurements of the femur, tibia, fibula, and calcaneus. (Adapted from Buikstra and Ubelaker 1994).

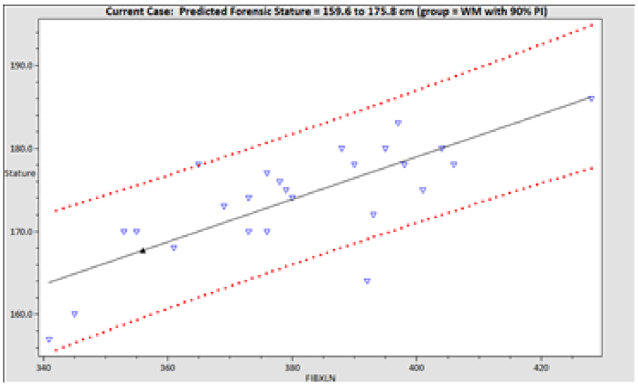

Figure 7: Estimated stature of the white male (WM) victim generated by FORDISC 3.1 from selected measurements on the femur, tibia, fibula, and calcaneus.

Antemortem	Biological profile (skeletal analysis)
Race: Caucasoid/White	Ancestry: European
Sex: male	Sex: male
Stature: 5' 4"	Stature: 5' 3" to 5' 9"

Table 3: Comparison of antemortem record and biological profile (analysis based on skeletal elements).

Based on the assessment of ancestry, sex, and stature of the remains, the biological anthropologist was confident that all of the isolated skeletal elements belonged to the victim. A comparison of the antemortem record and biological profile after the analysis supported that conclusion (Table 3).

Results and Discussion

Skeletal Trauma

The analysis of the cranium and post-cranium showed many fractures and displacements. This damage could not have occurred by animal scavenging or natural processes, such as the pressure of sediment or rocks on the bones over time. Because of their pattern, the cranial fractures were identified as having been caused by a high-velocity projectile (bullet), despite the fact that entrance and exit wounds were not obvious [10]. The biological anthropologist believed that the projectile damage to the cranium represented the second shot while the first shot was delivered somewhere in the postcranial region. This belief was based on close analysis of the killer's statement.

The postcranial damage were caused by a combination of blunt force trauma and sharp force chopping action in an attempt to dismember the victim, which occurred a short time (i.e., a few days to a month, after death) [11]. There was no evidence of projectile trauma on the postcranial remains.

The cranial fractures were very complex. There were two large radiating fractures which traveled over the central portion of the skull (Figure 8a). There were smaller radiating fractures on the forehead, on the top of the skull (plates of bone pushed outward), and on the right occipital bone on the back of the skull (Figure 8b). This indicates that the disruption of bone was explosive, resulting in extensive fracturing and fragmentation as seen in the skull. The missing left malar, maxillary bone (a large portion of it), and orbital margin form an irregular defect (Figure 4b). This could be the exit wound, but other damages-missing temporals and large portion of the occipitals-raised some doubts (Figures 4a and 8b). Skull radiographs would have not been useful because there was no brain to see the radiopaque trace of the bullet. In the recently deceased, the wound track of a bullet through the head is often clear in the postmortem radiographs [12]. The bullet leaves a radiopaque trace through the brain.

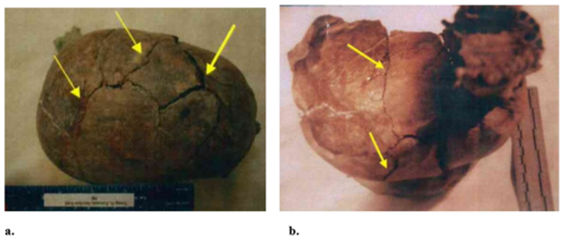

Figure 8a-b: Radiating fractures across the frontal, parietal, and occipital cranial bones (thin arrows: small fractures; thick arrows: large fractures).

Three Wound Track Hypotheses Based on the Fracturing Pattern

In the first wound track hypothesis (**I**), the projectile entered the lower right side of the head (which is the area of the missing temporal bone), generating three radiating fracturing lines: two traveled over the top towards the left side of the head and one down the right frontal bone towards the right orbit (Figure 9). The left temporal bone (the lower left side of head) is also missing. The left side of the face, which includes the temporal bone, eye orbit rim, left zygomatic or cheek bones, and a large portion of the maxilla, are all missing. It is hypothesized that this area could be the exit wound, since the damage and fracturing are more extensive. (Figure 10) gives another view of the damage [12]. There is also a fracture radiating from the middle of the left orbital bone-away from the probable exit wound area (Figure 9).

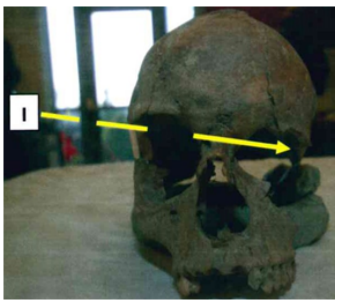

Figure 9: Wound track hypothesis: Shows anterior view of wound track **(I)** beginning at the right temporal bone and exiting through left eye (orbital bone).

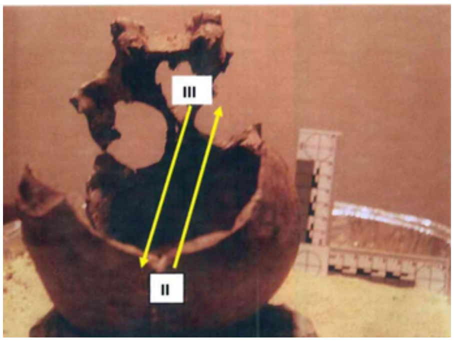

Figure 10: Wound track hypothesis: Shows wound track **(II)** beginning at the left occipital bone (back of head) and exiting through left eye (orbital bone); also shows wound track **(III)** beginning at the superior part of left eye and exiting through left occipital bone.

In short, the bullet probably entered the lower right side of the head. The energy created by the bullet generated three radiating fractures. These fractures traveled through the frontal bone and parietal bone (upper right and over the top of the head) and reached the left side of the head before the bullet. The bullet traveled through the right frontal lobe of the brain, dislodging a small portion of the frontal bone and sphenoid bone (the optic-canal portion), and exited through the superior part of the left eye (orbital bone). Intracranial pressure created by the bullet resulted in larger and extensive damage to this area (Figures 9 & 10). If this wound track hypothesis is correct, then self-defense would be difficult to prove because the victim was, more than likely, looking away from the killer or incapacitated (by the suspected first shot to the postcranial region) when he was shot in the right side of the head.

In the second wound track hypothesis (**II**), the bullet entered the left occipital bone (Figure 10). The energy created by the bullet generated one radiating fracture in the occipital bone and several in the parietal bones. These fractures traveled across the occipital, parietal and frontal bones creating damage (particularly in the parietals). The bullet traveled through the left frontal lobe of the brain, dislodging a small portion of the frontal bone and sphenoid bone (the optic-canal portion), and exited through the superior part of the left eye (orbital bone). Again, self-defense would be difficult to prove because in this wound track hypothesis the victim was also looking away from the killer or incapacitated when he was shot in the back of the head.

In the third wound track hypothesis (**III**), the bullet entered the superior part of the left eye (orbital bone) dislodging a small portion of the frontal bone and sphenoid bone (the optic-canal portion) (Figure 10). The energy created by the bullet generated radiating fractures in the frontal bone and several in the parietal bones. These fractures traveled across the parietal and frontal bones creating damage (particularly in the parietals). The bullet traveled through the brain and exited through the left occipital bone generating one radiating fracture. If this wound track hypothesis is correct, self-defense would also be difficult to prove because the victim could have been incapacitated (by the first shot in the postcranial region) when he was shot in the forehead.

While the three wound track hypotheses does not help the killer in his claim of self-defense, they do, however, provide an opportunity for the defense attorney to exploit this inconclusiveness (i.e., three hypotheses for the entrance and exit of the projectile) that results from missing key cranial elements, such as a large portion of the cranial base, particularly the basal parts of the right and left occipitals, and the right and left temporal bones, which might have provided stronger indications of entrance and exit wounds (if they were recovered) (Figure 10). Equally damaging is the possibility that this physical (cranial) evidence may be inadmissible under the *Daubert* guidelines due to the lack of potential error rates for wound tract in the cranium [13]. In short, the cranial-projectile–trauma evidence was equivocal. Nevertheless, abstract evidence in the form of the killer's statement was the critical factor in understanding the manner of death in this case.

Abstract Evidence

Before the skeletal remains of the victim were recovered, the killer made the following statement: "*I shot him in the head and then he started screaming loud, then I shot him again in the head just to shut him up*…" (14). Most people with basic knowledge of anatomy and physiology would be taken aback by this statement. Obviously, the killer did not have any knowledge of anatomy and physiology. Military and law enforcement literatures are replete with information on the "stopping power" of projectiles. For instance, Urey Patrick, in an article entitled "Handgun Wounding Factors and Effectiveness (1989), states that "*Physiologically, a determined adversary can be stopped reliably and immediately only by a shot that disrupts the brain or upper spinal cord*" [15]. There is much agreement with Patrick's statement in medical and forensic science [16-18]. In fact, forensic pathologists agree that loss of brain function is almost instantaneous after a firearm injury to the head penetrates or perforates the brain. Therefore, a bullet to the head will not elicit "screaming." As mentioned in the previous section, this biological anthropologist believes that the killer shot the victim in a region of the body below the head, which probably caused the victim to cry out or scream. In projectile trauma below the head, there is no physiological reason for an individual to die by even a fatal wound until blood loss is sufficient to drop blood pressure and/or the brain is deprived of oxygen [19]. The individual may survive for a few minutes to a few hours. In summary, the first shot likely was somewhere below the head, although there was no evidence on the postcranial bones of projectile trauma (and many of the large postcranial skeletal elements were missing), and the second shot, or kill shot, was given to the head-as indicated on the cranium-to "shut the victim up." This conclusion, supported by research from traumatic brain injury in addition to the projectile damage to the cranium, indicated murder. One shot to the postcranial region would have been enough to incapacitate the victim if this was a case of self-defense. Furthermore, concealing the crime and bragging about it did little to convince law enforcement of the killer's innocence.

Resolution

This case never went to trial. Two days before the trial was scheduled to begin (trial date was set for May 1, 2008) the killer confessed and agreed to plead guilty to third-degree murder. Whether this confession was due to his anxiety after seeing the reconstructed cranium of his victim in the Forensic Anthropological Report or to the force of the information on traumatic brain injury-rendering his version of events physiologically impossible and increasing his chances of being convicted of first-degree murder in a trial-is difficult to say. However, one could argue that the latter reason was the impetus for avoiding a trial. A sentence of 20 to 40 years is a better perspective than life in prison, especially if there is a chance of parole. Moreover, conclusions drawn from this case, which may be familiar to most but need to be reemphasized, are as follows: 1) forensic scientists must always consult the affidavits of the accused to aid in illuminating aspects of a case and must not focus solely on the physical evidence, especially if the physical evidence is inconclusive; 2) photographic images of the victim, whether it be soft tissue or skeletal remains, must be displayed prominently in the forensic report because they may have a powerful impact on the defense attorney and his or her client, forcing a speedy resolution; and 3) forensic practitioners must continually emphasize with state police CSI units the importance of having a forensic anthropologist on site to direct the recovery of skeletal remains.

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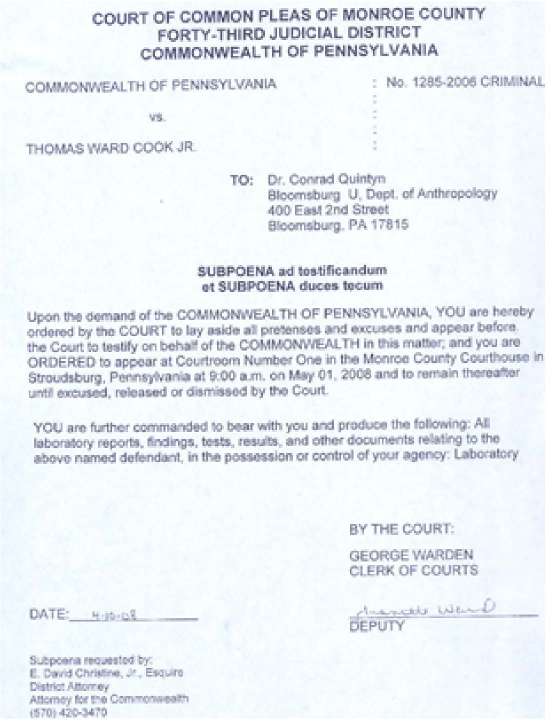
Supplement Information



COURT OF COMMON PLEAS OF MONROE COUNTY
FORTY-THIRD JUDICIAL DISTRICT
COMMONWEALTH OF PENNSYLVANIA

COMMONWEALTH OF PENNSYLVANIA : No. 1285-2006 CRIMINAL

vs.

THOMAS WARD COOK JR.

TO: Dr. Conrad Quintyn
Bloomsburg U. Dept. of Anthropology
400 East 2nd Street
Bloomsburg, PA 17815

SUBPOENA ad testificandum
et SUBPOENA duces tecum

Upon the demand of the COMMONWEALTH OF PENNSYLVANIA, YOU are hereby ordered by the COURT to lay aside all pretenses and excuses and appear before the Court to testify on behalf of the COMMONWEALTH in this matter; and you are ORDERED to appear at Courtroom Number One in the Monroe County Courthouse in Stroudsburg, Pennsylvania at 9:00 a.m. on May 01, 2008 and to remain thereafter until excused, released or dismissed by the Court.

YOU are further commanded to bear with you and produce the following: All laboratory reports, findings, tests, results, and other documents relating to the above named defendant, in the possession or control of your agency: Laboratory

BY THE COURT:

GEORGE WARDEN
CLERK OF COURTS

DATE: 4-15-08

DEPUTY

Subpoena requested by:
E. David Christine, Jr., Esquire
District Attorney
Attorney for the Commonwealth
(570) 420-3470

Supplementary Figure 1: Subpoena for biological anthropologist.

Supplementary Figure 2: Thomas Ward Cook Jr. in custody of Pennsylvania State Police, 2008.

Supplementary Figure 3: Images of the victim during life and postmortem.

PI	Measurement	Value	Point	Est	L 90%	U 90%	N	Slope	Intrcpt R-Square
8.1	FIBXLN	356	167.7	159.6	175.8	26	0.25727	76.10	0.588
8.1	CALCXL+FIBXLN	442	168.0	159.9	176.1	21	0.24156	61.23	0.654
8.3	FIBXLN+TIBXLN	722	168.2	159.9	176.6	24	0.13236	72.66	0.592
8.4	TIBXLN	366	169.3	160.9	177.6	26	0.24147	80.89	0.558
8.4	CALCXL+FIBXLN+TIBXLN	808	167.9	159.5	176.4	20	0.12787	64.62	0.642
8.5	CALCXL+FEMXLN 878+FIBXLN	878	165.8	157.3	174.3	20	0.14450	38.93	0.648
8.6	CALCXL+FEMBLN 876+FIBXLN	876	166.0	157.5	174.6	20	0.14484	39.16	0.640
8.7	FEMXLN+FIBXLN 1158+TIBXLN	1158	166.8	158.1	175.4	23	0.09728	54.14	0.593
8.7	FEMBLN+FIBXLN 1156+TIBXLN	1156	166.9	158.3	175.6	23	0.09718	54.61	0.589
8.7	CALCXL+TIBXLN	452	169.1	160.4	177.7	20	0.22217	68.63	0.614
8.7	CALCXL+FEMXLN 888+TIBXLN	888	166.6	157.9	175.3	20	0.13726	44.68	0.627
8.8	CALCXL+FEMBLN +TIBXLN	886	166.8	158.0	175.6	20	0.13726	45.19	0.618
8.8	FEMXLN+TIBXLN	802	166.9	158.0	175.7	25	0.14065	54.07	0.545
8.9	FEMXLN+FIBXLN	792	166.1	157.2	175.1	24	0.14144	54.12	0.553
8.9	FEMBLN+FIBXLN	790	166.3	157.4	175.3	24	0.14147	54.59	0.549
9.0	FEMBLN+TIBXLN	800	166.7	157.7	175.8	24	0.14555	50.30	0.547
9.3	FEMBLN+FEMXLN+FIBXLN	1226	166.1	156.8	175.4	24	0.09317	51.87	0.517
9.4	FEMBLN+FEMXLN+TIBXLN	1236	166.1	156.7	175.5	24	0.09738	45.77	0.517
9.5	CALCXL+FEMXLN	522	166.0	156.4	175.5	20	0.25243	34.18	0.562
9.6	CALCXL+FEMBLN	520	166.4	156.7	176.0	20	0.25342	34.60	0.548
9.7	CALCXL+FEMBLN+FEMXLN	956	165.3	155.6	175.1	20	0.13901	32.45	0.551

10.2	FEMXLN	436	166.9	156.8	177.1	29	0.23375	65.01	0.356
10.4	FEMBLN+FEMXLN	870	167.2	156.8	177.6	28	0.11652	65.82	0.347
10.4	FEMBLN	434	167.4	157.0	177.9	28	0.23176	66.86	0.343
11.2	CALCXL	86	174.6	163.5	185.8	22	0.79205	106.50	0.304

Supplementary Table 4: Additional stature data generated by FORDISC 3.1. (2023).