

MURDER AT OLD FIELDS



FORENSIC SCIENCE 2014

Spain Park High School

Kristie Cannon, Instructor

Materials credited to WARD's Natural Science Establishment and Bullfrog Communications, INC.

Purpose:

This lab is designed as a culminating activity requiring students to use different skills and knowledge that they have acquired during this course as well as basic analytical thought and deductive reasoning. This lab is based on an actual double murder that took place in 1842 in New York.

Your group will proceed through a series of labs/activities at your own pace. You must proceed in the correct order unless you get permission from me to move in a different order. It is essential that you use your class time wisely so that you can finish your project and turn in your binder on or before May 8th.

Lab Series:

- Introduction to Crime and Crime Scene
- Introduction to Victims, Suspects, and Evidence
- Hair analysis Lab (2)
- Blood Typing Lab (3)
- Fingerprint Lab (2)
- Blood Spatter Lab (5)
- Pathology Lab (2)
- Shoe impression Lab (2)
- DNA Lab
- Crime Analysis and Write up

Attendance:

If you miss more than one class period between 5/4 and 5/8 you must make up the time. You should make every effort to turn in a completed project on time so that exam exemption decisions may be made. Missing more than one day without making up the lab time will result in a deduction of 1/5 the total points for each day missed and not made up. Missing the LONG day counts as TWO class periods.

Grading:

The grade for this project has many components and **is not solely based on a correct answer**. Your lab partners will provide input on your participation grade. I will also visually assess your level of participation while you are working in groups. Please see the rubric for grading details.

Final Project Requirements

The final project should be placed in a three ring binder with each group members name on the outside of the binder. All materials should be placed in the correct order and must be on the original form. Your recorded answers must be neat and readable. Each member's grading rubric should be included in the front pocket of the binder (or the first pages if no pocket is available). Members will turn in their group evaluations in a sealed envelope left in the front pocket of the binder.

Murder at Old Field's Rubric

Student Name: _____

Activity/Lab	Possible Points	Points Earned	Comments
Crime Intro Questions	20		
Crime Suspect Chart	30		
Hair Lab 2	20		
Hair Lab 3	25		
Blood Typing 1	15		
Bloody Typing 2	20		
Blood Table 2	15		
Print Analysis (Type)	15		
Print Analysis (Owner)	15		
Spatter (Single Drop)	15		
Spatter (Multiple Drop)	15		
Spatter (Walking drop)	15		
Spatter (velocity)	20		
Spatter (evidence analysis)	15		
DNA	20		
Shoe Impression	20		
Pathology (Alex)	20		
Pathology (Rebecca)	20		
Summary Tables	15		
Case Summary	50		
Participation	50		

TOTAL: _____ (450)

Begin this activity by reading over pages 5-13 as a group. Fill out your crime sheet (page 1) in your project binder. It is essential that you understand the case background before proceeding.

LESSON 2: THE CRIME

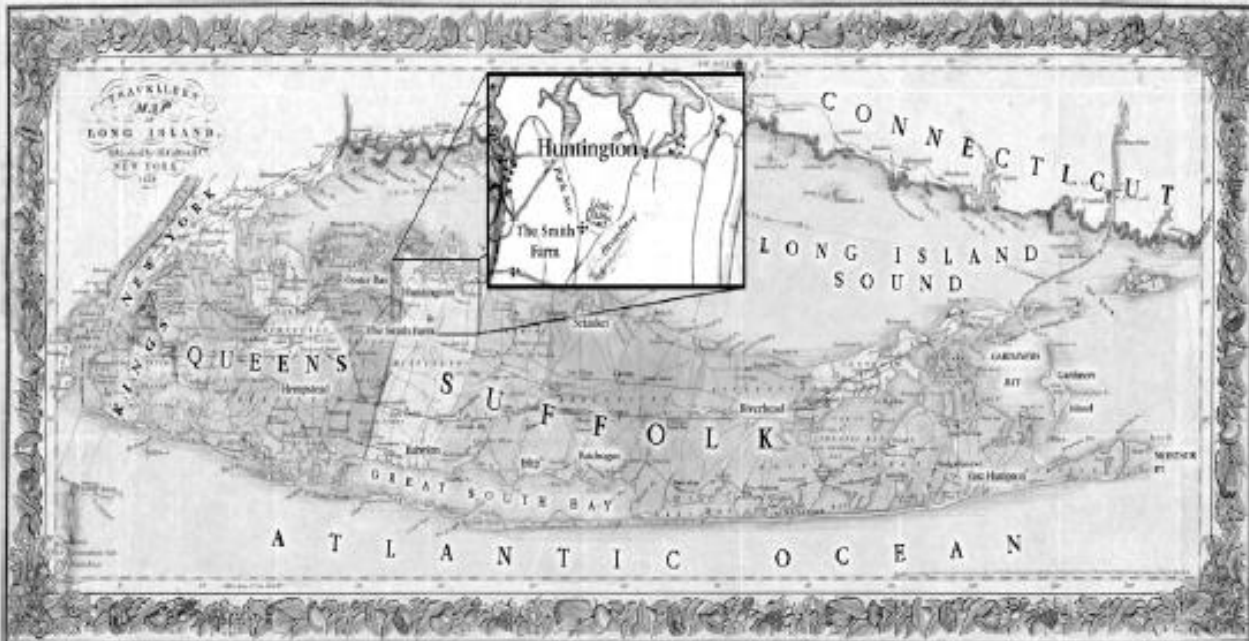
The article on the following page was printed in *The Long Islander* newspaper on Friday, November 18th, 1842, just five days after the grisly double-murder of Alexander and Rebecca Smith, a prominent, wealthy, and well-respected married couple who ran Smith Farm, in what was then known as Old Fields (now Greenlawn) on Long Island, New York.



The crime made nationwide news, as much for the gruesome manner in which it was committed, as for where it occurred – in front of the hearth of a quaint and prosperous farmhouse, in a peaceful, quiet, rural farming community.

Because of this crime, the house itself, which still stands today on the corner of Park Avenue and Little Plains Road in Greenlawn, New York, became notorious. Some said it was haunted by ghosts; others pointed to the geraniums in the front window, which seemed to bloom all year long, defying the regular cycles of nature.

The behavior of the frugal and reclusive heirs to the Smiths, who lived in the farmhouse until 2003, only added to the legend. The house fell into disrepair, and took on the chilling appearance of a haunted house.



The Long Islander.

HUNTINGTON, FRIDAY, NOV. 18.

HORRIBLE MURDER!

NEVER has it been our melancholy task, on any former occasion, to present to our readers the details of a murder, so atrocious in every feature, as the one committed a few nights ago in the vicinity of our village. We do not remember to have heard of one so appalling, for many years.

On Sunday evening last, Mr. Alexander Smith, extensively known as a worthy and wealthy farmer, residing at Old Fields, and his wife, were murdered. Their bodies were discovered on the following morning, lying on the hearth;—that of Mr. Smith nearly consumed by the fire into which it had fallen, on receiving a blow from the assassin; and that of Mrs. Smith, near by, weltering in blood which had flowed from several wounds inflicted on the head.

THE CRIME SCENE



It seemed like any other Monday morning for George Weeks, who was reporting for work as a farmhand at Smith Farm on November 14th, 1842. As he normally did, he walked to Smith Farm from his house about a quarter of a mile away.

As he approached the Smith Farm property, something immediately caught his attention. Mr. Smith's dog was barking wildly from within the workshop, located some distance from the farmhouse. This was unusual because Mr. Smith usually kept his dog with him overnight in his bedroom.

Mr. Weeks then noticed that the window to the east room of the farmhouse was shattered. Now suspicious of foul play, he looked into the window at the front of the house, and saw Mr. and Mrs. Smith lying on the floor, covered in blood.

Weeks immediately ran back to his house for help, and returned soon after with a few neighbors. Upon entering the house, they saw that Mr. and Mrs. Smith had been murdered.

The Suffolk County Coroner, Darling B. Whitney, reported that "*Alexander (Smith) lay with his head away from the fire place, his body was chiefly consumed (burned) up to his 3rd or 4th rib.*"



George Weeks



Fireplace Crane

Mr. Smith was in the habit of sitting in front of the fire after tea with his feet on the fireplace crane that hung over the fire. It was surmised that, after a blow to the head, he fell off his chair, and the fireplace crane swung his feet into the fire, which then burned the lower part of his body.

Rebecca Smith's body was found next to her husband, to his right. Whitney reported that: *Mrs. Smith was lying in the right corner of the fireplace; her head at the corner of the hearth... her dress was bloody down to her waist... She seems from appearances to have struggled. There was blood in the middle of the floor, and spread to the place where she lay.* Blood droplets were found elsewhere throughout the house; various footprints were also discovered, as were a hammer and an axe at the crime scene, which may have been used to commit the murders.

Four people connected with the Smith family have been determined to be suspects – George Weeks not being one of them because his alibi checks out with multiple sources.

You can learn more about these suspects on pages 8-9. As the lead investigator in this case, your assignment is to examine the evidence provided, and, using what you've learned, present a case to identify the murderer.

The following is an actual excerpt from the deposition (an out-of-court testimony made under oath) taken from Darling B. Whitney, M.D., Coroner for Suffolk County, who was called to the crime scene at about 1 p.m. on Monday, November, 14th.

"Alexander lay with his head from the fire place, his body was chiefly consumed up to his 3rd or 4th rib. His body was examined in his presence by Dr. Ray; there were three wounds on the left side of his head, immediately over the lower portion of the cartilage of the left ear – making three holes through the cartilage; large cut at the interior and posterior cartilage of the same ear. The skull was fractured on the top of the head. The wound must have occasioned the death – wounds must have been inflicted with some heavy instrument like a hammer, with a flat end. No appearance of his having struggled. He thinks deceased must have been lying upon his back when the wound upon the top of his head was inflicted.



Coroner
Darling B. Whitney

Mrs. Smith was lying in the right corner of the fireplace; her head at the corner of the hearth. She has two wounds upon the forehead, one producing a fracture of the skull, the other a depression. There were four wounds upon the upper and posterior part of the head, one creating a depression of the bone – supposes the same instrument must have inflicted the wound that caused the death of Alexander – her dress was bloody down to her waist: supposed some of the wounds on Mrs. Smith's head to have been inflicted when she was lying down. Her death must have been occasioned by the wounds referred to. She seems from appearances to have struggled. There was blood in the middle of the floor, and spread to the place where she lay. From their positions, thinks Mr. Smith must have been killed first.

THE VICTIMS

At the time of his murder, Alexander Smith was 69 years old and could walk only with the use of canes. His wife, Rebecca, was several years younger. They were wealthy and well-respected members of the community. Their murders were a shock to the rural, small-town community of Old Fields, Long Island and made national news.



Victim 1:
Name: Alexander Smith
Sex: Male
Age: 69
Height: 5'8"
Hair Color: Grey



Victim 2:
Name: Rebecca Smith
Sex: Female
Age: 57
Height: 5'4"
Hair Color: Grey

THE SUSPECTS



Suspect 1: The Veteran Farmhand
Name: Henry Bawer
Sex: Male
Age: 30
Height: 5'7"
Hair Color: Brown

Suspect 1: At the time of the murders, Henry Bawer had been a farmhand for the Smiths for two years, his first and only job since he emigrated from his native Germany. Because he could speak both English and German, Mr. Smith often asked him to act as an interpreter between himself and the new farmhand, Anton Geisler. Bawer testified to being aware that Mr. Smith was a very wealthy man. Bawer testified to having tea with the Smiths in the front room on the evening of the murders. Although this was not the first time he had tea with his employers on a late Sunday afternoon, it was unusual. After tea, Bawer claimed in his trial testimony, he returned to the little cottage where he lived elsewhere on Smith Farm. Police who reported to the crime scene noticed cuts on Henry's hands which, he claimed, had been caused by doing farm chores.



Suspect 2: The New Farmhand
Name: Anton Geisler
Sex: Male
Age: 24
Height: 5'7"
Hair Color: Blonde

Suspect 2: Anton Geisler arrived at Ellis Island, New York from Germany on July 1, 1842, and was confined there for a few months until he recovered from an illness. He was told there was farm work to be had on Long Island, so he made his way east until he arrived at Smith Farm in Old Fields. Mr. Smith agreed to pay him \$4 for his first month's work. He was also given lodging in a room on the second floor of the farmhouse. His fellow farmhand, Henry Bawer, testified that Geisler told him he was getting along quite well in his first month, although he complained that Mr. Smith mocked him because he couldn't speak English. Geisler was at the Sunday afternoon tea with the Smiths and Bawer. He claimed that, because his month's work was over, he had received his pay after tea and left the farm. Police noticed that his pants were torn at the knee, with some blood visible there as well. Geisler said that the wound was incurred while working the farm.

THE SUSPECTS



Suspect 3: The Household Help

Name: Mary Ann Abbot
Sex: Female
Age: 23
Height: 5'5"
Hair Color: Brown

Suspect 3: Mary Ann Abbot was Mrs. Smith's niece. She had been employed by the Smiths to help manage the household for about one year prior to the murders. She cooked and cleaned, and took care of the elderly couple. Like Geisler, whom she had befriended, she lived in an upstairs room at the farmhouse. It was Miss Abbot who told police about the money that Mr. Smith kept in the money chest.

According to her trial testimony, she left the house Saturday morning to go home to see her mother. She claimed that she did not return to the house until Monday morning, when she reported to work as usual.



Suspect 4: The Peddler

Name: Francis Curran
Sex: Male
Age: 45
Height: 5'10"
Hair Color: Black

Suspect 4: Francis Curran was a Long Island peddler and had been practicing his trade in the Old Fields community for some three years prior to the murders. In rural America at the time, there weren't many convenient stores, so peddlers like Curran would travel from farm to farm selling goods and supplies from their horse-drawn carts. Curran testified that he did visit the Smith farmhouse as part of his rounds on Saturday, and also on Sunday, in the early afternoon. An eyewitness claimed to have seen his cart passing slowly by the farmhouse at the time of the murders.

THE EVIDENCE

(Refer back to this list as necessary)



State of New York HOMICIDE INVESTIGATIVE UNIT

Town of: Old Fields
Submitting Officer: Sheriff Brush
Date: November, 18, 1842
Case No. : 1267

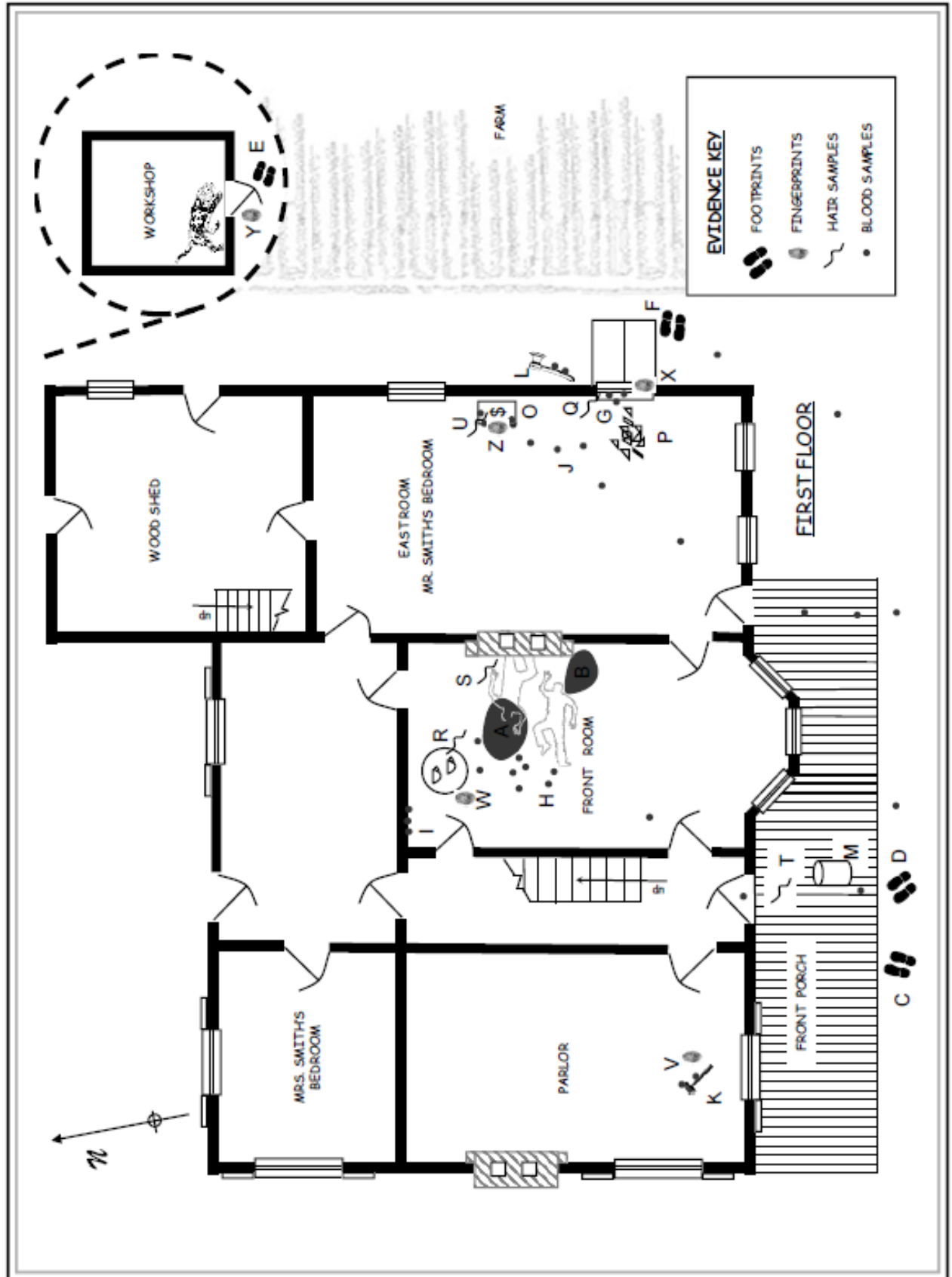
EVIDENCE LIST

- | | |
|---------------------------------------|---|
| A. Body / Blood Pool A | O. Blood Droplets on Money Chest |
| B. Body / Blood Pool B | P. Glass Shards on East Room Floor |
| C. Footprint near Front Porch | Q. Hair Strand(s) by East Room Window |
| D. Footprint near Front Porch | R. Hair Strand(s) by Front Room Tea Table |
| E. Footprint near Workshop | S. Hair Strand(s) on Front Room Floor |
| F. Footprint near East Room Window | T. Hair Strand(s) on Front Porch |
| G. Blood Drop on East Room Window | U. Hair Strand(s) on Money Chest |
| H. Blood Droplets on Front Room Floor | V. Fingerprint on Hammer |
| I. Blood Pattern on Front Room Wall | W. Fingerprint on Teacup |
| J. Blood Droplets on East Room Floor | X. Fingerprint on East Room Window |
| K. Blood Droplets on Hammer | Y. Fingerprint on Workshop Door |
| L. Blood Droplets on Axe | Z. Fingerprint on Money Chest |
| M. Blood Drop on Powder Canister | |

Signed: Sheriff William E. Brush

Witness: Jehnathan H. Stevens

THE SCENE



You may move through the following activities (pages 15-50) in any order. I highly suggest dividing up the tasks within your group. All the modules are labeled at the front of the classroom. You may help yourself to any available module. Please see me if you have any questions. For some of the labs you may want to use your notes for background information.

Hair Labs	pages 15-22	binder pages 2-3
Blood Typing Lab	pages 23-29	binder pages 4-6
Fingerprinting Lab	pages 30-31	binder page 7
Blood Spatter Lab	pages 32-43	binder pages 8-13
Shoe Impressions	pages 44- 45	binder page 14
Pathology	pages 46-48	binder pages 15-18
****DNA	pages 49-50	binder pages

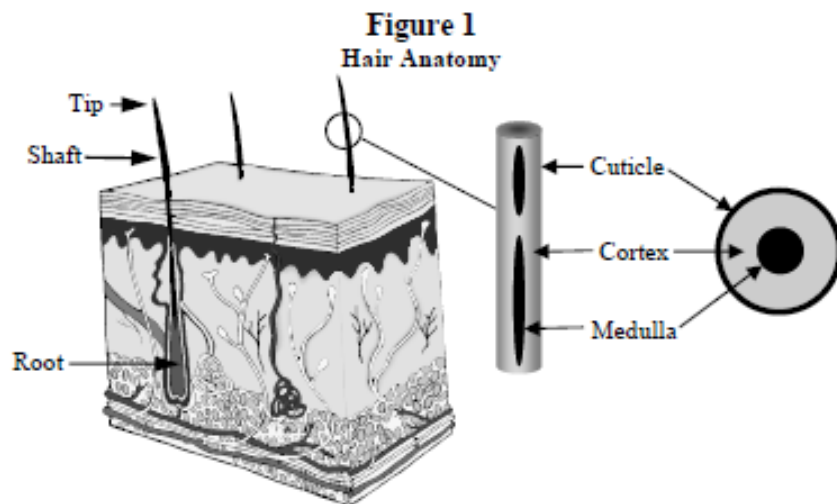
***** must be done last

Hair Labs (pages 15-22)
(binder pages 2-3)

LESSON 3 - HAIR ANALYSIS

Background:

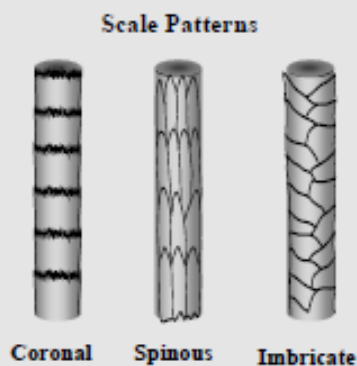
Hair is a physical feature unique to mammals. It originates and grows from living connective tissue within a follicle. Each growing hair consists of a living root embedded in the skin and a non-living shaft projecting above the skin. The hair shaft is composed of the fibrous protein, keratin, and is made up of three layers: the cuticle, the cortex, and the medulla (Figure 1).



What are the Morphological Characteristics of the Hair?

Hair is one type of fiber analyzed and compared as physical evidence. When attempting to link an individual to a crime, it is necessary to perform a much more exhaustive examination of the hair(s) in question. Characteristics such as color, length, diameter, medulla patterns, and medulla shape are of particular importance.

Figure 2



The Cuticle

The cuticle, or outermost layer, is made up of dead, translucent cells that form scales that give hair its strength. The cuticle can have one, or a combination, of three basic scale patterns: coronal (crown-like), spinous (petal-like), or imbricate (flattened), as shown in Figure 2. Variations of these basic types are possible. The condition of the cuticle (undamaged or damaged) will determine the level of strength, shine, and texture of the hair shaft.



DID YOU KNOW?

Hair is naturally colored by pigment granules (melanin) in the cortex whereas dyed hair has pigment in the cuticle as well as the cortex.

Hair samples taken from the same individual can display a variation of medulla patterns between individual hair follicles and within the same hair follicle.

Animal hair will show a much wider medulla (less cortex) compared to human hair. Not all human hair contains a medulla.

The Cortex

The color of hair is determined by the amount and type of the melanin pigment contained within the cortex. Hair containing a high concentration of melanin (eumelanin) appears brown or black and hair with a low concentration of melanin (pheomelanin) appears blond or red. Hair that lacks melanin appears white or gray. In humans, the density and distribution of pigment is relatively consistent throughout the length of the hair shaft, whereas in animal hair, the pigmentation is usually more dense toward the medulla. Animal hair may also show sudden color changes (called banding).

The Medulla

Sometimes the hair shaft has a central layer, or core, called the medulla. When present, this layer may appear in one of three different patterns: fragmented, intermittent, or continuous (Figure 3). This portion of hair can appear quite different from one species to the next and from one individual hair to another. For example, the width of a human medulla is less than one-third the overall diameter of the hair shaft but is generally greater than one-third in animals. It is this variation that helps scientists identify hair from textile fibers and distinguish the species from which hair originated. As seen in Figure 4, there are several types of medulla structures.

Figure 3

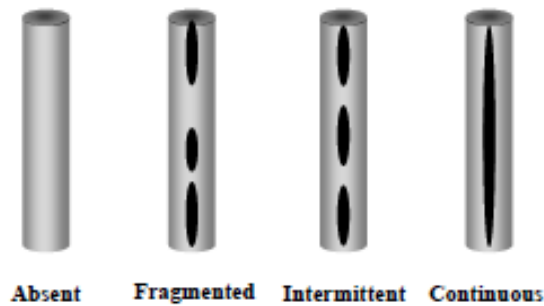


Figure 4
Medulla Structures

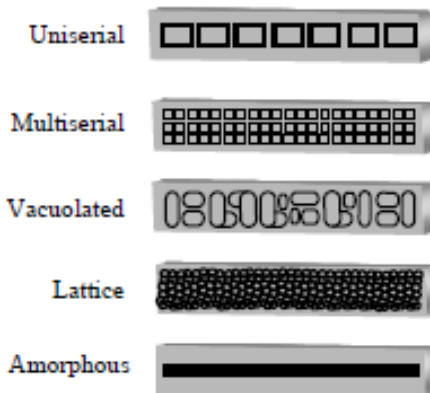


Figure 5
Shapes of Hair in Cross-section



Hair Shape

When human hair is cut and viewed in cross-section, it will appear either circular, oval, or flattened (Figure 5). A forensic examiner recognizes the correlation between hair shape and racial origin. Straight hair appears circular in cross-section, and is characteristic of Asian ancestry (Mongoloid race). Hair that appears more oval in cross-section is characteristic of European ancestry (Caucasoid race), and hair that appears flattened in cross-section is characteristic of African ancestry (Negroid race). However, as many people in the United States are of mixed ancestry, hair shape alone is not a useful indicator of a person's racial characteristics.

Hair Lab 1

Record all answers on binder page 2

Hair Lab 1 Instructions (Reference Samples)

Creating Reference Slides **(THIS HAS BEEN DONE FOR YOU)**

1. Label the slide with the donor's name.
2. Using scissors cut a 2cm piece of hair.
3. Using a piece of clear tape, draw the hair up to the tape by placing the tape close to (but not touching) the hair. The hair should jump up to the tape.
4. Place the tape on the labeled slide and smooth out any air pockets.
5. Observe the hair under the microscope using medium power. Make sure that you scan the entire length of the hair sample.
6. Record your observations on the data table on binder page 2.
7. Repeat for all reference samples.

Creating a Scale Pattern Impression **(YOU HAVE TO DO THIS YOURSELF)**

1. Spread a thin layer of clear nail polish onto a microscope slide.
2. Quickly place a strand of hair into the nail polish (try not to wiggle) leaving one end free.
3. Wait about 1 minute for the polish to harden. Grasp the free end and lift the hair upwards (out of the nail polish).
4. Wait for the polish to fully dry, observe the hair under the microscope noting the scale pattern.
5. Record the scale pattern on the data table on binder page 2.
6. Repeat for all reference samples.

Hair Lab 2

Record all answers on binder page 3

Hair Lab 2 Instructions (EVIDENCE)

Creating Evidence Slides **(THIS HAS BEEN DONE FOR YOU)**

1. Label the slide with the donor's name.
2. Using scissors, cut a 2cm piece of hair.
3. Using a piece of clear tape, draw the hair up to the tape by placing the tape close to (but not touching) the hair. The hair should jump up to the tape.
4. Place the tape on the labeled slide and smooth out any air pockets.
5. Observe the hair under the microscope using medium power. Make sure that you scan the entire length of the hair sample.
6. Record your observations on the data table on binder page 3.
7. Repeat for all evidence samples.

Creating a Scale Pattern Impression **(YOU HAVE TO DO THIS YOURSELF)**

1. Spread a thin layer of clear nail polish onto a microscope slide.
2. Quickly place a strand of hair into the nail polish (try not to wiggle) leaving one end free.
3. Wait about 1 minute for the polish to harden. Grasp the free end and lift the hair upwards (out of the nail polish).
4. Wait for the polish to fully dry, observe the hair under the microscope noting the scale pattern.
5. Record the scale pattern on the data table on binder page 3.
6. Repeat for all evidence samples.

Blood Typing Labs (pages
24-29)
(binder pages 4-6)

Blood Typing Lab 1

Record all answers on binder page 4

Blood Typing Lab 1

Scenario:

Blood was collected from both victims and the four suspects. Analyze each sample to determine the blood type. This information will create the control sample that will be needed later to compare to blood found at the scene.

Materials Needed per Group:

Wax Pencil

6 Blood Typing Trays

Simulated Anti- A Serum

Simulated Anti- B Serum

Simulated Anti- Rh Serum

Toothpicks

Microscope Slides

Coverslips

Blood Samples:

Victim 1

Victim 2

Suspect 1

Suspect 2

Suspect 3

Suspect 4

Procedure:

1. Label all six blood typing wells by placing them on a sheet of paper and labeling it as follows:

Victim 1 – Alexander Smith
Victim 2 – Rebecca Smith
Suspect 1 – Henry Bawer
Suspect 2 – Anton Geisler
Suspect 3 – Mary Ann Abbot
Suspect 4 – Francis Curran

2. To determine the blood type of the blood found at the crime scene, place 2-3 drops labeled "Victim 1 – Alexander Smith," in each of the A, B, and Rh wells of the blood typing tray labeled "Victim 1– Alexander Smith."
3. Place 2-3 drops of the simulated anti-A serum in the A well of the tray.
4. Place 2-3 drops of the simulated anti-B serum in the B well of the tray.
5. Place 2-3 drops of the simulated anti-Rh serum in the Rh well of the tray.
6. Obtain three toothpicks. Stir each sample of the anti-serum and blood with a separate clean toothpick for approximately 30 seconds. To avoid splattering the simulated blood, angle the toothpick and do not press down too hard on the typing tray.
7. Determine whether or not each well has a positive agglutination reaction (Figure 1). (*Agglutination can be thought of as "clumping" . Clumping or "clouding" are valid indicators of agglutination.*) To confirm agglutination, try reading text through the mixed sample. If the text does not clearly show through the liquid, assume you have a positive agglutination reaction. Observe the slide and record your observations in Table 1 on page 4

Figure 1



Blood Typing Lab 2

Record all answers on binder pages 5-6

Blood Typing Lab 2

Scenario:

The morning after the murders, when the bodies of the victims were first discovered, two pools of blood were found in the living room and droplets of blood were found throughout the house and outside the house. Blood was also found on the window sill near the broken window in the east room.

You or your group will analyze all of the blood evidence to determine the blood type recovered from each piece of evidence. Then, you must compare this data with the data you previously collected in the first blood typing lab.

Materials Needed per Group:

Wax Pencil

8 Blood Typing Trays

Simulated Anti-A Serum

Simulated Anti-B Serum

Simulated Anti-Rh Serum

Toothpicks

Blood Samples:

Exhibit A: Blood Pool A

Exhibit B: Blood Pool B

Exhibit G: Blood Drops – East Room Window

Exhibit H1: Blood Drops – Front Room

Exhibit H2: Blood Drops – Front Room

Exhibit J: Blood Drops – East Room

Exhibit K: Blood Drops – Hammer

Exhibit L: Blood Drops – Axe

Procedure:

1. Label all six blood typing wells by placing them on a sheet of paper and labeling it as follows:

Exhibit A: Blood Pool A
Exhibit B: Blood Pool B
Exhibit G: Blood Drops – East Room Window
Exhibit H1: Blood Drops – Front Room
Exhibit H2: Blood Drops – Front Room
Exhibit J: Blood Drops – East Room
Exhibit K: Blood Drops – Hammer
Exhibit L: Blood Drops – Axe

3. To determine the blood type of the blood found at the crime scene, place 2-3 drops of the blood labeled "Blood Pool A" in each of the A, B, and Rh wells of the blood typing tray labeled "Blood Pool A".
4. Place 2-3 drops of the simulated anti-A serum in the A well of the tray.
5. Place 2-3 drops of the simulated anti-B serum in the B well of the tray.
6. Place 2-3 drops of the simulated anti-Rh serum in the Rh well of the tray.
7. Obtain three toothpicks. Stir each sample of anti-serum and blood with a separate clean toothpick for approximately 30 seconds. Do not press down too hard on the typing tray.
8. Determine whether or not each well has a positive agglutination reaction. To confirm agglutination, try reading text through the mixed sample. If the text does not clearly show through the liquid, assume you have a positive agglutination reaction. Observe the slide and record your observations in Table 1 on page

5

9. Repeat steps 3-8 to determine the blood type of each of the remaining samples.
10. Using the data you collected in the first blood typing lab, compare the blood from the victims and suspects with the blood found on the scene. Record your findings in Table 2 on page

6

Fingerprinting Lab (pages
30-31)
(binder page 7)

Fingerprinting Lab

(Record answers on binder page 7)

Procedure:

1. In the module you will find a set of reference prints for each of the victims and suspects.
2. Obtain the six evidence samples from your instructor.
3. Determine the type of print and record on the data table page 7.
4. Match to one of your reference samples.
5. Record your answers on data table page 7.

Blood Spatter Labs (pages
32-43)
(binder pages 8-13)

Blood Spatter Lab 1

Record all answers on binder page 8

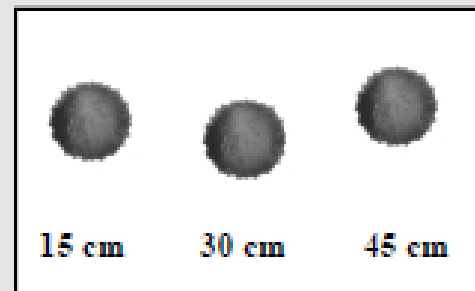
(If you are confident in your blood spatter lab data you may use it rather than repeat the steps listed here)

Blood Spatter Analysis Lab 1

Materials Needed per Group:

Vial of Drip and Projected Blood
5 x 8 Index Cards
Tape Measure
Magnifier

Figure 1



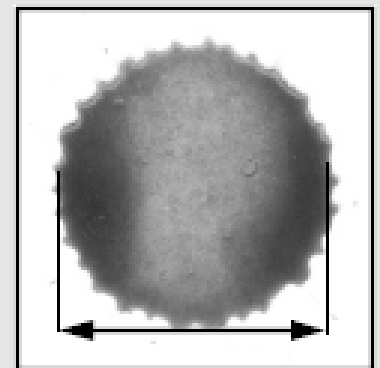
Procedure:

In order to interpret the blood spatter patterns, you must first create reference spatters under controlled conditions.

Part A: Single Vertical Drop Spatter Patterns

1. Obtain two 5 x 8 index cards and place them on the table in front of you. Each card will be used to collect three blood drops dropped from different heights (Figure 1). Thus, it is important to space the three drops on each card so that they do not touch one another.
2. Hold the blood dropper bottle upside down in a vertical position so that the dropper end is 15 cm from the target surface (card). This is easiest when a partner holds a tape measure in place.
3. Gently squeeze the bottle so that one drop is released from the bottle at the 15 cm height and lands on the target surface. Label this drop as 15 cm.
4. Move the dropper so that you will not hit the same spot on the card and repeat Steps 2 and 3 from the vertical heights of 30 cm and 45 cm (Figure 1). Obtain another card and repeat Steps 2 and 3 from the vertical heights of 60 cm, 75 cm, and 100 cm. Label each drop and height.
5. Observe the spatter patterns. When the blood drops are dry, measure the diameter of the circular part of the drop in millimeters (Figure 2). If there are spines or protrusions on the drop, disregard them as part of the measurement. Measure the diameter of the droplet, and record the information in Table 1 located on page 8
6. Create a sketch of the blood droplets in the spaces provided in Table 1.

Figure 2



Blood Spatter Lab

2

Record all answers on binder pages 9-10

(If you are confident in your blood spatter lab data you may use it rather than repeat the steps listed here)

Part B: Multiple Drop Spatter Patterns

1. Obtain one 5 x 8 index card and place it on the table in front of you.
2. Hold the blood dropper bottle upside down in a vertical position so that the dropper end is 15 cm from the target surface (card).
3. Gently squeeze the bottle so that one drop is released from the bottle at the 15 cm height and lands on the target surface. Do not move your hand from that height or position and release a second drop onto the first drop. Label this spatter as 15-cm multiple drop.
4. Using a new index card for each height, move the dropper to a vertical height of 30 cm, 45 cm, 60 cm, 75 cm, and 100 cm, making two drops for each height on the target surface. Label each drop and height.
5. Observe the patterns, measure the diameter of each droplet, and record the information in Table 2 on page 50.
6. Create a sketch of the blood droplets in the spaces provided in Table 2.

Blood Spatter Lab

3

Record all answers on binder pages 11

(If you are confident in your blood spatter lab data you may use it rather than repeat the steps listed here)

Walking Drop Spatter Patterns

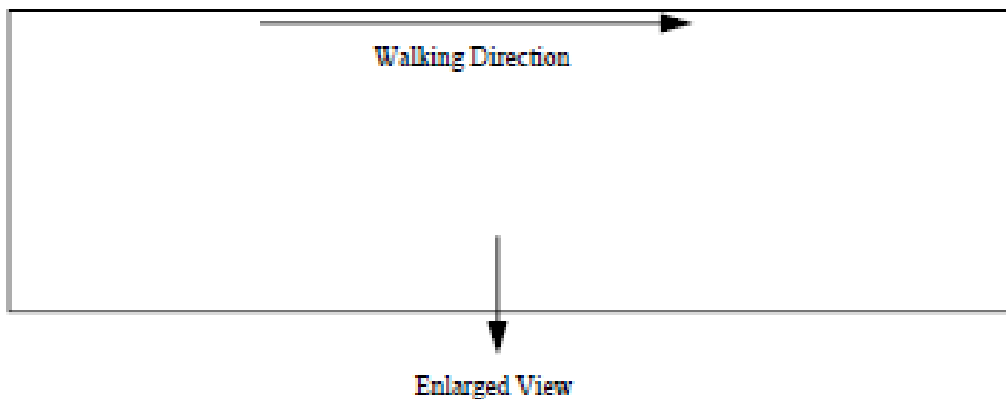
Materials Needed per Group:

Bottles of Drip and Projected Blood
3' Sheet of Paper from Roll
Masking Tape
Magnifier

Procedure:

1. Tape the paper to the floor.
2. Obtain one bottle of Drip and Projected Blood. Stand next to the sheet of paper taped to the floor.
3. Hold the bottle of blood out over the paper at approximately waist level.
4. Squeeze the bottle of blood gently so that drops begin to fall. Begin walking at a normal rate along the strip of paper on the floor while drops continue to fall. Try to keep the drops on the paper.
5. Allow the blood to dry. Note the specific pattern of the droplets on the paper. Make a sketch of a typical walking blood drop pattern in the space provided below. What do you notice about the orientation of the spines?

Typical Walking Blood Drop Spatter



Blood Spatter Lab

4

Record all answers on binder pages 12

(If you are confident in your blood spatter lab data you may use it rather than repeat the steps listed here)

Impact Force and Blood Stain Patterns

Materials Needed per Group:

4' Piece of Paper from the Roll
Bottle of Simulated Drip and Projected Blood
Masking Tape
Toothbrush
Measuring Tape

Medium-Velocity-Impact Spatter

1. Tape the target surface (paper from the roll) to a wall or vertical board.
2. Position your hand horizontally approximately 20-30 cm from the target surface with the palm side down, and the fingers parallel to the surface. Place a small pool of Simulated Drip and Projected Blood (approximately the size of a quarter) on the top of your hand (Figure 4).



Figure 4

3. Using the fingers of your other hand, slap the hand with the pool of blood pushing your fingers forward in a perpendicular orientation to the target surface (Figure 4).
4. Carefully remove the target surface with the bloodstain, label it as "Medium-Velocity-Impact Spatter, 90-Degree Angle" and set it aside.
5. Repeat Steps 2-3 above. This time, slap the horizontal bloodied hand with your fingers at an angle OTHER THAN 90 DEGREES.
6. Repeat Step 4, but label the stain as "Medium-Velocity-Impact Spatter, Other Than 90-Degree Angle".
7. When the stains are dry, measure the long axis of the smaller stains. Typically, they should be approximately 1-4 mm in length.

High-Velocity-Impact Spatter

1. Use the same paper you used for the medium-velocity spatter.
2. Using a hard bristle toothbrush, cover the tips of the bristles with Simulated Drip and Projected Blood.
3. Aim the brush directly at the target surface (perpendicular to the surface) and rub your finger across the tips from front to back, so that the blood sprays onto the surface. The pattern will be very light and the blood drops will be small.
4. Repeat the process in Steps 1-3 above, but this time orient your brush AT A DIFFERENT ANGLE to the target surface.
5. Carefully remove the stained target surfaces and label them as "High-Velocity-Impact Spatter, 90 Degrees" and "High-Velocity- Impact Spatter, Other Than 90 Degrees". Allow the stains to dry.
6. When the stains are dry, measure the long axis of the smaller stains. Typically, they should be <1 mm in length.

Blood Spatter Analysis

Record all answers on binder pages 13

Evaluation of Blood Spatter Patterns

The following page contains images of blood spatter evidence found at key locations at the farmhouse crime scene.

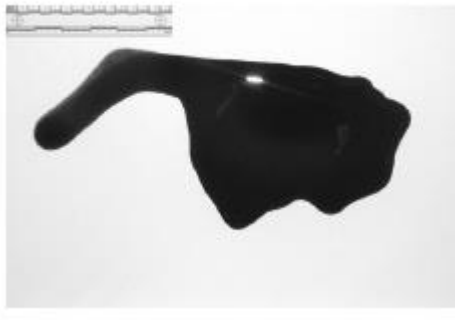
In each photograph, a 15-cm (or approximately 6") scale is shown to provide you with some perspective.

1. Carefully evaluate the blood spatter evidence shown .
2. Draw upon your knowledge of blood spatter patterns to determine the type of event that most likely occurred to create the bloodstain.

Evidence G - Blood Drop (East Room Window)



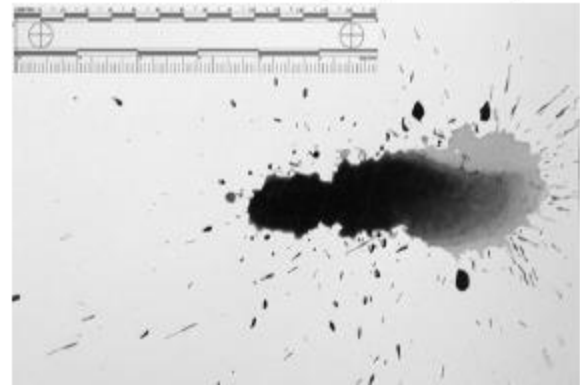
Evidence A - Bloody Pool A



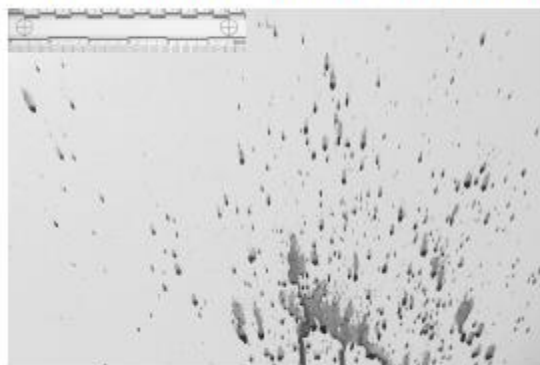
Evidence B - Bloody Pool B



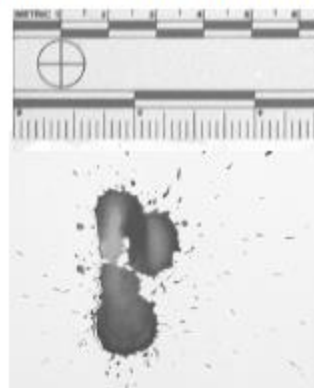
Evidence H - Blood Droplets (Front Room)



Evidence I - Blood Pattern on Wall (Front Room)



Evidence J - Blood Droplets (East Room)



Shoe Impressions and Analysis

Record all answers on binder pages 14

Shoe Impression Lab 2

Matching the Crime Scene Footprints with the Control Footprints

Inked shoe impressions have been made of the shoes or boots of the two victims and four suspects. These are the control samples against which the evidence from the crime scene will be matched.

Your instructor will provide the inked shoe impressions and the pre-created castings made of shoe impressions from the scene of the crime.

These four sets of footprints were found:

1. At the entrance to the front porch (Exhibit C)
2. At the entrance to the front porch (Exhibit D)
3. Outside the workshop (Exhibit E)
4. Outside the east room window (Exhibit F)

Procedure:

1. Inspect the plaster casts taken as evidence from the crime scene and compare them to the inked shoe impressions of the four suspects and two victims.
2. Based on your observations, match the impressions cast at the crime scene with the inked control impressions and fill in the table on page

14

Pathology Reports

Record all answers on binder pages 15-18

LESSON 9 - PATHOLOGY

Scenario:

Pathology can mean many things in the context of medicine, but in the context of forensic science, pathology is considered to be the cause and manner of death. In the case of the double-murder of Alexander and Rebecca Smith, the primary means of this determination is an examination of the bodies, usually conducted in an official way by the County Coroner.

Although the bodies of the victims are not available for your inspection, the actual coroner's report of the autopsies is available for you to study. The coroner in this case was Joseph H. Ray, M.D., Suffolk County Coroner, and his autopsy report follows on page 48

Much can be learned from the coroner's report on these murders. Both bodies were burned, for example. Was that the cause of death?



Materials Needed per Group:

Black Marker

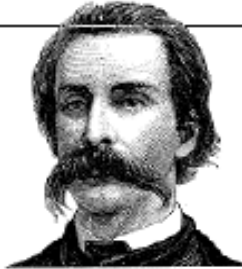
Red Marker

Procedure:

1. Read the coroner's report of his examination of the body of Mr. Smith.
2. On the autopsy diagrams on page 66, use a black marker to draw a 1-cm-diameter circle at each location on the skull where a hole was found. Page 15 instead of page 66
3. Use a red marker to color the skeleton diagrams on page 67 to indicate all of the bones that were described by the coroner as having been burnt. Page 16 instead of page 17
4. Repeat steps 1-3 for Mrs. Smith's body.
5. Determine the cause of death for each victim. Possible causes of death include: *overdose, heart attack, old age, cancer, blunt force trauma, asphyxiation, fire/burns, hanging, gun shot wound, drowning*. Fill in the appropriate blank space in each autopsy diagram.
6. Determine the manner of death for each victim. Possible manners of death include: *homicide, suicide, natural, or accidental*. Fill in the appropriate blank space in each autopsy diagram.



State of New York
SUFFOLK COUNTY
OFFICE OF THE MEDICAL EXAMINER



I saw the deceased on November 15th between 8 and 9 o'clock; the bodies of Mr. and Mrs. Smith were lying near the fireplace in the front room

Mr. Smith's head had a few wounds on it, two of them were to the **right Auditory Meatus**. One was found along the **Lambdoidal Suture** of which had driven the hair into the head and wounded the brain; it was a rough incision done by a blunt edged instrument; there was another wound found on the **Parietal bone**, an inch and a half in length inflicted by a similar blunt object.

In addition Mr. Smith's body was found consumed in ashes up to his **Femoral greater trochanter** and the lower part of the **ischium**.

Mrs. Smith's head was found resting on the floor; there were three wounds on her head. One to the **Frontal bone** of the skull, one to the **right Parietal bone** near the coronal suture, and one to the **right Temporal bone** near the **Sphenoid bone**.

Mrs. Smith's body was also slightly burnt. The extent of burns were minor in comparison to Mr. Smith's burns. Burns were found up to the middle of the **medial crest** of each **fibula**.

It is unclear to me at this time what the cause of death for each victim is. Each victim may have been burned alive and then beaten with a blunt object, or killed first with a blunt object and then burnt. Further investigation should reveal the order of these events.

Joseph H. Ray

Joseph H. Ray, M.D.
Suffolk County Coroner

11/18/42

Date

DNA Reports

Record all answers on binder page 19

DNA Fingerprinting Lab 1

Scenario:

Using blood samples obtained from the victims and suspects, investigators have been able to compile a DNA Control Sample for these six individuals. (See victim and suspect DNA patterns on the left side of the graphic below.)

Additionally, investigators have collected blood samples at the crime scene. (See the exhibit DNA patterns on the right side of the graphic below.) Your job is to match the DNA patterns found at the crime scene with those of the control samples from the victims and suspects. (Important: the DNA patterns below are from one of the blood samples found at each crime scene location; there may have been others.)

Procedure:

1. Carefully examine the DNA fingerprinting band pattern in the graphic below.
2. Compare the DNA fingerprinting band pattern for each of the suspects and victims, with the DNA fingerprinting band pattern that the investigators discovered in the blood samples at each of the various locations at the crime scene.
3. Complete the DNA Evidence Table on page 59 by placing a check mark under the person who matches the DNA pattern of the blood found at each location of the crime scene.

Use the data table on page 19

(ASK Instructor for copy of DNA gel)

Fill out the summary tables on binder pages 20-22

Fill out the evidence summary on page 23

Fill out the conclusion on page 24

Turn your binder into Mrs. Cannon

(Make sure to turn in your partner evaluations in a sealed envelope in the pocket of the binder)