

LAB: Crime Spree Analysis

Introduction

One job of the crime scene investigator is to find **latent fingerprints** (those that are left by perspiration or grease and aren't immediately visible to the naked eye) and develop them. That is, treat them so they can be seen, inspected and classified. In this lab, you will practice various methods (physical and chemical) for developing latent prints on different types of surfaces (porous or nonporous).

Materials

- Carbon Powder/Brushes
- Silver Nitrate Solution
- "Fixer"
- Sharpie Marker and pencils
- Evidence bag
- Lifting tape
- Microscope slides (6 per group)
- Ninhydrin
- Steam iron & paper towels
- Tweezers
- Gloves
- Filter paper- approximately 3"x3" (4 per group)
- Hot plate w/ small aluminum dish
- Liquid super glue
- Hand lens

Procedure

You will be taking turns being the "good guys" and the "bad guys" (i.e.-you will be leaving the evidence behind as criminals and processing someone else's crime scene as a forensic investigator).

Part A- Creating the Evidence

1. Each squad member will be numbered off (1-5). This will be your suspect number.
2. The table below shows the types of evidence each "suspect" left behind. These pieces of evidence, known as exhibits, will be analyzed by another group. In all cases, you will be using your **RIGHT THUMB** print.
3. To leave a QUALITY fingerprint you need lots of oils and perspiration. To accomplish this you may either:
 - a. Run up and down the stairs of X-hall several times (until you are perspiring) and rub your right thumb across the bridge of your nose afterward OR
 - b. Run your right thumb through your hair multiple times (until it is oily).
4. See the specific procedure for the details of making the evidence listed below.
5. CAREFULLY place all 10 pieces of evidence in a baggie labeled with your suspect numbers.
6. Each squad should turn in all of their evidence baggies at the same time to the teacher.
7. Use the ink pads to produce a quality set of visible prints on the print cards provided. **Only print your RIGHT THUMB!**
8. Switch your thinking caps from "bad guys" to "good guys".....

	Exhibit A <i>(microscope slide)</i>	Exhibit B <i>(filter paper)</i>	Exhibit C <i>(filter paper)</i>	Exhibit D <i>(microscope slide)</i>
Suspect 1	X	X	X	
Suspect 2	X	X		X
Suspect 3	X			X
Suspect 4	X		X	

MAKING YOUR EXHIBITS

Exhibit A,D-Microscope Slide

1. Obtain a clean microscope slide. Carefully handle the slide from the edge. If it is not clean or print free (or you are unsure), wash and rinse it with distilled water. Wipe it dry making sure that no unwanted fingerprints appear on the glass surface.
2. Label the slide “Exhibit A” or “Exhibit D”. Place the label so it does not interfere with the fingerprint you will deposit.
3. Hold the microscope by the sides with a piece of paper towel. Rub your **RIGHT THUMB** on the bridge of your nose between the eyes and place a distinct right thumb print on the surface of the slide.

Exhibit B, C– Filter Paper

1. Using a pencil, label a piece of filter paper “Exhibit (B or C)” at the top of the paper. Make sure you do not touch the piece of filter paper in the process (use tweezers!)
2. Rub your **RIGHT THUMB** on the bridge of your nose between the eyes and place a distinct right thumb print in the middle of the paper

Part B- Developing the Evidence

PROCEDURE: READ ALL STEPS BEFORE ATTEMPTING TO DEVELOP!

Each of you will act as the primary officer for one of the crime scenes. As the primary officer, it is your responsibility to develop and initially analyze the prints from your scene. On the student data sheet, indicate for which crime scene number you are the primary officer. Place the names of the other group members in the other officer blanks. Based on your findings, you will bring one gangster to justice, and the entire gang will go down as a result of your team’s careful development and analysis of the evidence.

SAFETY PRECAUTIONS: *Students MUST wear goggles at all times during this lab. Do NOT inhale the carbon powder dust. Ninhydrin will stain your skin and clothing if it comes in contact with them. Do NOT get superglue on your skin and do not breathe the fumes because they irritate mucous membranes. Silver nitrate will stain your skin a dark color when exposed to sunlight.*

1. Some of these techniques allow the prints to last for a long period of time (some even forever), but others fade quickly. It is imperative to make the match in a short period of time if the method of development will not allow you to do so at a later time.
2. Be sure to classify each print—and since you know they all come from the right hand, you can identify whether it is an “ulnar” or “radial” loop when necessary.
3. An effective method of comparing fingerprints is to trace certain minutiae from the exemplar prints and try to overlay it onto the questioned print. This is often easier and quicker than measuring alone.
4. Looking for bifurcations are often the easiest pieces of minutiae to look for as they are easy to identify and very common in print patterns.
5. Remember, if all 5 points of minutiae do not match up, then the print is not a match.
6. Record your data in the tables provided. You must confer with the rest of your team to ensure you know which gang member perpetrated each crime scene on your case load.
7. You **MUST** obtain your teacher’s initials after moving from each station to verify that you properly cleaned up!

Exhibit A: Microscope Slide

Technique: Carbon Powder Dusting

1. Obtain a dusting brush and a glass container for the powder. Make sure the brush is clean and the bristles are separated, but **DO NOT WET THE BRUSH**.
2. Place a very small amount of powder into the glass container (a little goes a long way!). Dip the brush into the powder and **GENTLY** dust the area containing the print. If you brush too hard, you will smudge the print.
3. Once you have developed the print, shake off any excess powder.
4. Unroll a piece of clear tape about 5-6" from a roll. You may fold over part of the loose end so you have a non-sticky handle.
5. Place the sticky part of the tape over the entire print and press down. Run your thumb across the tape to force out any air bubbles.
6. Pull the tape up from the roll end and it should remove the print with it. Place the piece of tape onto an index card. Affix the tape in the same manner as above.
7. Cut tape from the roll.
8. Compare the print to the sample prints.
9. Use classification of the print and at least 5 pieces of minutiae, including measurements from the core, to make this match.

Exhibit B: Filter Paper

Technique: Silver Nitrate

1. Use tweezers to immerse the filter paper in the Silver Nitrate (AgNO_3) solution for 5-10 minutes. **NOTE:** The AgNO_3 will darken your skin in sunlight if it comes in contact with it!
2. Remove the paper from the dish.
3. Sandwich the paper between paper towels to dry it, then expose the paper to long-wave UV light
4. Carefully watch the development of the print (**DO NOT OVEREXPOSE**).
5. To finish developing and "fix" the print, immerse it in the fixer solution for 15 to 20 minutes.
6. Remove and blot dry with paper towel
7. Compare the print to the sample prints.
8. Use classification of the print and at least 5 pieces of minutiae, including measurements from the core, to make this match.

Exhibit C: Filter Paper

Technique: Ninhydrin

1. Develop the print using ninhydrin techniques. You will need to wear gloves as the ninhydrin will dye the amino acids in your skin purple!
2. Tape the filter paper to a piece of paper towel so that the labeled side is facing up. Hold the filter paper and paper towel over the sink and spray entire sample with ninhydrin. Make sure the entire filter paper is covered with ninhydrin.
3. Remove the evidence from the paper towel (wearing gloves still) by holding the sample from the corner with tweezers.
4. After allowing the sample to dry for a few minutes, you will hold the paper over the boiling beaker of water until the print develops. Make sure the side with the print (labeled side) is facing the water.
5. Compare the chemical print to the sample prints.
6. Use classification of the print and at least 5 pieces of minutiae, including measurements from the core, to make this match

Exhibit D: Microscope Slide

Technique: Superglue Fuming

1. Develop the print using superglue fuming techniques.
2. Place a piece of fuming dish on the bottom of the fuming chamber. Add 3-5 drops of superglue to the bottom of the dish evenly. Put the dish on the hot plate surface.
CAUTION: Superglue will adhere to your skin which could destroy the evidence
3. Place the slide (label side UP) and angled against the side of the chamber. Turn on the hot plate to low and seal the chamber.
4. In about 10-15 minutes, a permanent print should appear.
5. NOTE: You may use carbon powder to lift the print if desired as the superglue has made the print permanent—see below for procedure
6. Compare the glue print to the sample prints.
7. Use classification of the print and at least 5 pieces of minutiae, including measurements from the core, to make this match.

Part C: Analyzing the evidence

DataTable: Crime Scene #1

Primary Officer <i>(developed evidence)</i>	Secondary Officers <i>(group members)</i>		
Evidence at Crime Scene	Classification of Print	5 pieces of Minutiae	Suspected Perpetrator
Exhibits _____			

Data Table:

Primary Officer <i>(developed evidence)</i>	Secondary Officers <i>(group members)</i>		
Evidence at Crime Scene	Classification of Print	5 pieces of Minutiae	Suspected Perpetrator
Exhibits _____			

Data Table: Crime Scene #3

Primary Officer <i>(developed evidence)</i>	Secondary Officers <i>(group members)</i>		
Evidence at Crime Scene	Classification of Print	5 pieces of Minutiae	Suspected Perpetrator
Exhibits _____			

Date Table: Crime Scene #4

Primary Officer <i>(developed evidence)</i>	Secondary Officers <i>(group members)</i>		
Evidence at Crime Scene	Classification of Print	5 pieces of Minutiae	Suspected Perpetrator
Exhibits _____			

Analysis Questions (*answer all questions—even if you did not perform the required test! This may require collaborating with your team*)

1. Complete the following table indicating what “substance(s)” reacts to allow a latent print to become visible for each type of physical or chemical means of development.

Test Performed	Type of Surface Test is Appropriate For	Reacts with Substance(s)	Color of Developed Print
Carbon Powder			
Superglue Fuming			
Ninhydrin			
Silver Nitrate			

2. Some techniques for developing fingerprints are temporary. What would a crime scene investigator need to do to “preserve” these temporary fingerprints? Explain why it would be important to save this evidence.

3. Create a flow chart that could be used to determine the order in which the various tests performed today could be used. The first part of the flowchart has been started for you.

