Crime Scene

Updated by Karl Muster (added fingerprinting activity)

**Topics:** scientific method, chromatography (pigments), finger prints, deductive reasoning  
**Grades:** Any (review of scientific method and deductive reasoning is up to you)

[Good for an end of the year lab]

**Materials**

Chromatography:
- Pens (several different sets of pens: numbered according to batch or type)  
- Coffee filters (cut into strips 1 inch in width and as long as possible; 4-6 strips per filter; 1 filter per student)  
- 1 tall clear plastic cup per pair of students  
- Water or weak acetone (fill cups with about half an inch)  
- Fake note (optional)  
- Paper clips

Fingerprinting:
- Wooden pencil or charcoal  
- Clear adhesive tape  
- Fine brush (optional)

**Part 1: The Scene of the Crime**

In this activity, you can draw students' interest in solving mysteries to convey some important scientific concepts, methods, and techniques. One of the WonderWorks volunteers (or a teacher in the same grade level) has stolen the materials for a really fun experiment, and it's up to the students to find out who is responsible. The only thing they left was a note and one of the supplies that they dropped. Students will use chromatography to see which suspect's pen matches the ink on the note. They will also practice taking their own finger prints and then compare the fingerprints of each suspect with the print pattern found on the object. The class can be split into two groups if needed, and they can switch half-way through.

**Part 2: Chromatography**

Water moves up the paper because of capillary action (for the kids, you can just say that it works against gravity and that water molecules link together to climb up the paper, use a wet paper towel as an example of how it absorbs water and the water moves up). This movement of water up the filter paper will cause the pen ink to separate and to form a unique pattern. Since each batch of pens was made a little differently, they should hypothetically have different patterns.

Pass out a strip of filter paper to each group. Have the students draw a straight line across the width of the filter strip about an inch above the bottom with one of the pens on a strip, then stick an unfolded paper clip through the top. Then have them place them into the cup filled with half an inch of water or acetone, hanging from the paper clip across the opening of the cup (make sure the water is below the pen line and that they don't drop the paper into the liquid). After the water has reached near the top (about half an inch from the top), have the students take it out. Now have them compare this with the master copy of the pen pattern (you need to make this and remember which pen it came from).
Part 3: Fingerprinting

Optional:
From the object left behind, use a fine brush with graphite or charcoal powder to reveal the fingerprints left on the object [clean object beforehand, moisten fingertips using oil or syrup, touch the object (don't use all your fingers, use your right thumb); avoid direct contact with the object where you touched it]. Use tape to remove the graphite and stick the tape to a sheet of white paper.

Everyone has unique fingerprints, and your fingerprints stay the same your entire lives. The police has a record of adults' fingerprints in a large database, and it can be used as evidence for crimes. Have the kids take a fingerprint of their right thumb. To do this, you use the pencil and draw on an index card back and forth, making a dark box. Rub your thumb across it once or twice so it's slightly shiny in the light. Apply a strip of tape across your thumb, remove tape, and stick it to a clean index card. If time permits, the students can make the card into a secret agent ID card. Maybe you can have small pictures of the students prepared to go next to it. Go over the types of fingerprint patterns.

![Fingerprints Illustration](http://www.fingerprints.tk)

Give out several copies of each suspect's right thumb fingerprint. Also have the fingerprint pattern found on the object left at the scene. The largest fingerprint from the scene should be from the culprit's right thumb, which is separate from the others, which would make sense for grasping an object with your right hand. Have the students label the type of fingerprint pattern for each suspect and the scene.

The activities can be more exciting if students need both experiments to determine the culprit. You can do this by choosing one of two suspects with the closest fingerprint prints, and then have different pairs of suspects use the same type of pen. You can also have multiple thumb prints on the object, like if someone brought in the supplies and another person stole it.

Part 4: The Verdict

Have the students come back together and come up with a final verdict. The culprit will have the last of the supplies in their backpack. Recover the supplies and do a fun, short demonstration of your choosing (diet coke and mentos, elephant toothpaste, baking soda volcano, seltzer rockets, etc.).