

Procedure Notes (Continued)

Rose could have deposited the brown hair found on the sweater, but it could also be Lily's. The tip suggests it has not been cut for a while—it is more like Lily's. Iris has short, blond hair, very recently cut, as evidenced by the flat-cut end, but when was it cut? Camellia can be ruled out because her hair is frayed, not cut. Or can she? Maybe not all her hair is frayed. However, bleaching can often be seen under the microscope.

The evidence points to Violet. The students may not have the knowledge yet to form an opinion that can withstand cross-examination, but once their ideas are heard, and the facts explained, they will know what observations to make as lab activities progress.

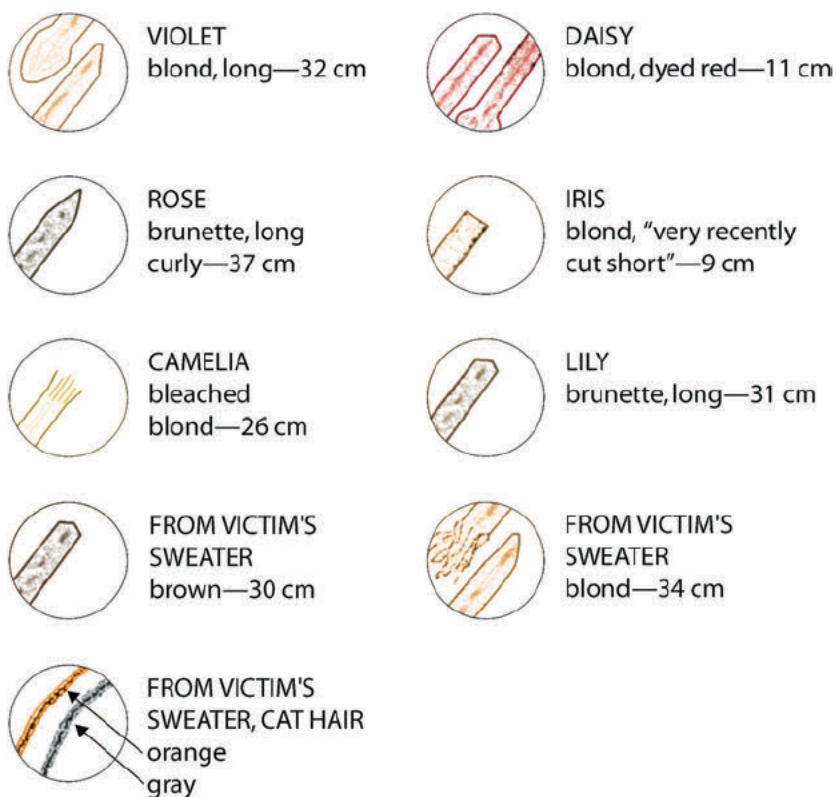


Figure 5.1 Hair from crime scene

LABORATORY ACTIVITY 5.1: Observation of Hair

Consider where you have hair on your body. Is the hair all the same?

Materials

- magnifying glass or stereomicroscope
- embedding medium
- compound microscope
- set of animal hairs
- microscope slides
- cover glasses
- glycerin or mineral oil
- scissors
- ruler



SAFETY ALERT! CHEMICALS USED

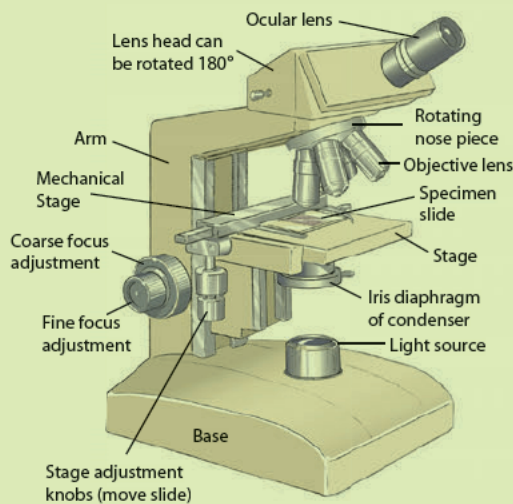
Always wear goggles and an apron when working in the laboratory



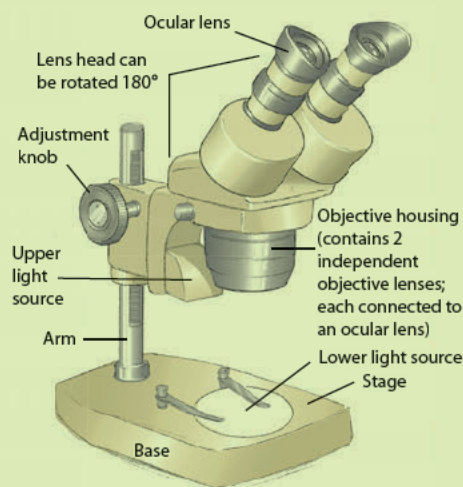
SAFETY NOTE Also wear disposable lab gloves. Avoid inhalation, ingestion, and skin contact with chemicals.

Procedure

1. If you have long enough hair, run a comb or brush through it and collect three to five strands. If you cannot collect hair samples with a comb, then pull three to five strands of hair from your scalp. If your hair is too short, then have a friend cut three to five hairs close to the scalp.
2. Lay your samples out on a piece of white paper. Pull them taut and measure and record their length, in centimeters.
3. Record the hair color.
4. Borrow hair from some lab partners with different-colored hair and look at it under a magnifying glass or microscope. Sometimes playing with the amount of transmitted light will make the hair color more distinctive. Another trick is to place a hair on a black background and observe it in reflected light. Color is a very important characteristic for the forensic scientist. Save your hair samples by taping them in your notebook or placing them in an envelope. You will need them later.
5. You will be using a compound microscope to look at the hairs you have collected so far. Start with the lowest magnification, 40 \times .
6. Place the hair sample on a microscope slide and add a drop of glycerin or mineral oil. Anchor it with a cover glass. Adjust the light through the condenser for best viewing. Look at the entire length of your sample. Note the ends.
7. Cut a piece of your hair with sharp scissors and compare that end with the others.



Compound microscope



Stereomicroscope

Procedure Notes: You can prepare a permanent set of hair samples using an embedding medium such as Norlands NOA65, Paraplast (www1.fishersci.com), or Canadian balsam. The latter two are far more difficult to work with; Paraplast is messy and prone to bubble formation, while balsam must be heated just right, and bubbles may still result. The students will provide some interesting pet hairs. A trip to a pet store or zoo is rewarding. Take a lot of little envelopes and a marking pen. If you have a strong stomach and little pride, go after recognizable roadkill in the spring or fall.

Most of us can grow only about three feet of hair before it stops getting any longer. The world's longest hair, according to Guinness World Records (www.guinnessworldrecords.com), with a length of more than 18 feet, belonged to Xie Quiping of China.

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Answers:

1. Answers will vary.
2. Color; length; appearance of the tip; any hair treatment; curliness; diameter, perhaps; microscopic structure; smell; etc. See pages 117 and 118.

morphology: form and structure

polymer: a molecule consisting of many identical repeating units; polymers can be naturally occurring or synthetic

LAB ACTIVITY 5.1: Observation of Hair continued

8. Repeat your observations with the other strands of your hair.
9. Draw a typical part of your hair and the ends. Make your drawing at least twice as large as what you see.
10. Pluck a hair from your eyebrow or eyelash or arm and compare it to your scalp hair. Examine and draw scalp hairs from at least three other students.

Analysis

1. Are there any unusual features that set one sample apart from the others?
2. What characteristics do you think a forensic scientist would look for in describing hairs?
3. Record all observations and answer any questions in your lab notebook.

The Form and Structure of Hair

You will need to understand the form and structure, or **morphology**, of hair before you can analyze it as evidence. The average human body has about 5 million hairs! Most of these are fine, downlike hairs that cover practically your entire body. Blond people have the most hair on their head—about 120,000 strands. Redheads have at least 80,000. People with

black and brown hair have about 100,000. Hairs are continuously shed and renewed at a rate of about 100 each 24-hour period from the scalp alone, so it's not surprising that hair is commonly found in our personal environment (again, remember the Locard Exchange Principle). When two people struggle physically, each is likely to leave his or her hair on the other.

Hair is made up mostly of complex cross-linked protein **polymers**. These polymers are very resistant to breaking down. Hair grows from a tubelike organ in the sublayer of skin (dermis) called a hair follicle (see Figure 5.2). The hair's root is embedded in the follicle. The

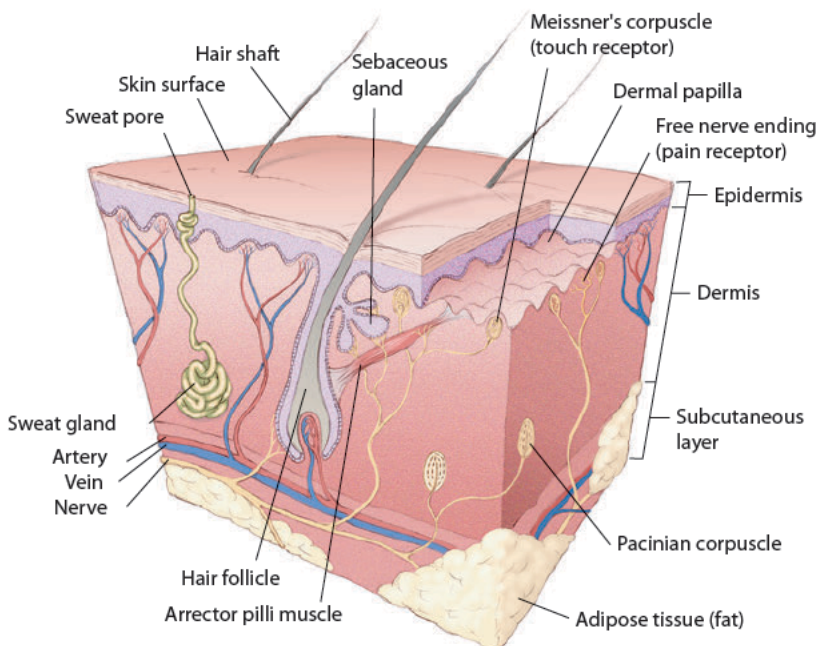


Figure 5.2 Cross section of human skin

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