

Lab

Examining Mammalian Hair

**Background Information**

Ectotherms are animals that must obtain the heat they need from the environment. Ectotherms, therefore, depend heavily on environmental conditions in order to keep their internal body temperatures within their desired operating range. Endothermic animals, on the other hand, can maintain a relatively constant body temperature because they generate heat internally. Mammals are endothermic animals that rely on metabolic activities in order to obtain the heat they need. Many mammals can pant or sweat in order to release excess heat into the environment. In order to conserve heat mammals use various combinations of fur, hair, and subcutaneous fat. In this laboratory investigation, you will examine the nature of hair.

**Problem**

What are the characteristics of hair?

**Materials** (per group)

comb or brush	methylene blue
glass slide	microscope
cover slip	scissors
electric light or bright sunlight	toothpick
hand lens or dissecting scope	medicine dropper

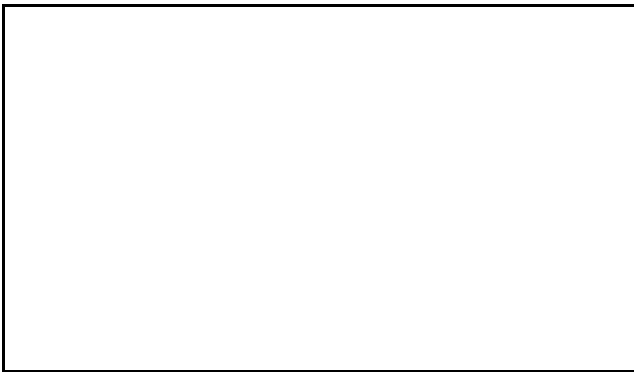
**Procedure**

1. Using a medicine dropper, put two drops of methylene blue in the center of a clean glass slide.
2. Comb or brush your hair vigorously to remove a few loose hairs.
3. From your comb or brush, select two hairs that each have a root attached. Look for a small bulb-shaped swelling at one end of the hair. This is the root.
4. Using the scissors, trim the other end of the hairs so they will be short enough to fit on the slide. Place the trimmed hairs in the drops of methylene blue on the slide.
5. Gently rub the inside of your cheek with a toothpick.
6. Stir the material from the inside of your cheek in the methylene blue between the hairs on the glass slide. Cover the specimens with a cover slip.
7. Use the low-power objective to locate the hairs and some of the material from the inside of your cheek. Then switch to the high-power objective and focus with the fine adjustment.
8. When the hair appears to be in perfect focus, you are looking at the inside of the hair strand. The inside of the hair is made of keratin, a secretion of epidermal cells in the hair follicles of your scalp. Make a sketch of the hair strand in the space provided.

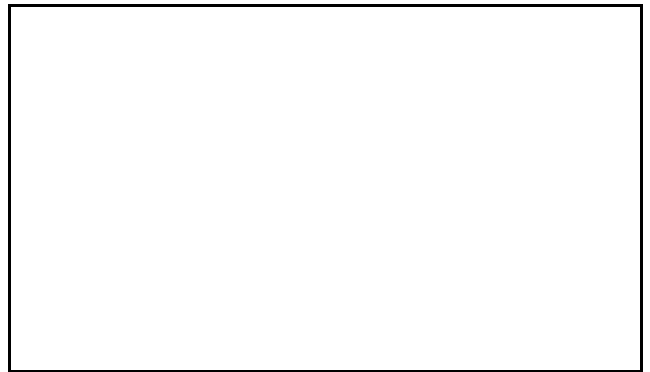
9. Turn the fine adjustment toward you (counterclockwise) to focus on the upper surface of the hair. At one point in your focusing, the hair will appear to be covered by overlapping structures that look like shingles. Make a drawing of a section of hair showing the overlapping appearance of the epidermal hair cells.
10. Locate some of the epidermal cells scraped from the inside of your cheek. Compare the size and shape of these cells to the overlapping cells on the hair strand. (Remember the layers of overlapping cells on the strand of hair are only partially visible.)
11. Under bright light, use the hand lens to examine a portion of your skin that does not seem to be covered with hair. (Do not examine the palms of your hands or the soles of your feet).

### Observations

**Hair Strand**



**Overlapping Appearance**



1. Describe the appearance of a strand of hair under magnification.
2. How does the appearance of the epidermal cells from your cheek compare to the cells covering the strand of hair?
3. What did you observe when you examined the surface of your skin under bright light?

### Analysis and Conclusions

1. What covers the surface of your body and the body of most mammals?
2. Based on your observations, what is hair?

### **Critical Thinking and Application**

1. When you are frightened, you may get chills on the back of your neck. This feeling is associated with small erector muscles at the base of the hairs on your neck making the hairs stand up. What adaptive value does this response to fear have for many mammals?
2. Mammals are endothermic animals. What does this mean? Is having a covering of hair or fur consistent with the characteristics of endotherms? Explain.
3. Most terrestrial chordates can be successfully grouped into classes (amphibians, reptiles, birds, and mammals) by considering skin covering alone. Describe how this could be done. Then, classify the following based on skin covering: chicken, cat, frog, snake, wolf, pigeon, and hamster.
4. In what ways is a duckbill platypus obviously a mammal? In what ways is it atypical of mammals?