

CLASS COPY



Hair Lab



on

A person has methodically planned and executed the "perfect murder." The perpetrator has gone to great *lengths* ensuring no physical evidence such as fingerprints or cigarettes were left behind. However, our perpetrator has forgotten to anticipate the possibility of unknowingly leaving a strand of hair behind. Whether this hair is scalp, arm, facial (beard or mustache), or chest hair, it can be analyzed by the forensic scientist for many characteristics.

Hair presents itself as indirect or circumstantial evidence in a court of law. This evidence would be used in conjunction with other forensic evidence. The forensic scientist would testify that "the two hairs are very similar." The testimony would not be, "In my expert opinion, these two hairs are the same," as would be the case for fingerprints.

The forensic scientist is examining hair for cuticular scales, color (due to pigment granules), shape of medulla, and the medullary index. Most often the forensic scientist is dealing with animal hair (cat, dog, etc.).

Hair Anatomy

Humans and most other mammals have hair located over their bodies to prevent heat loss. This is illustrated in Figure 1. Hairs taken from different regions of a person are *not* the same.

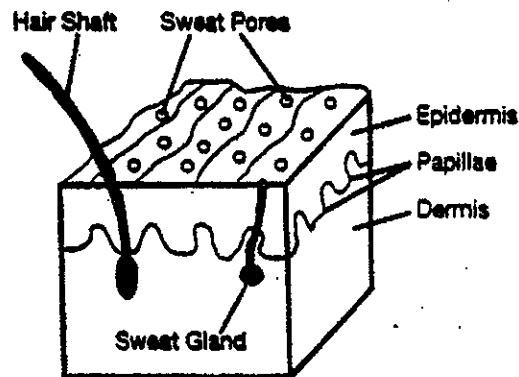


Figure 1.



Hair Lab Information

Cuticle Patterns

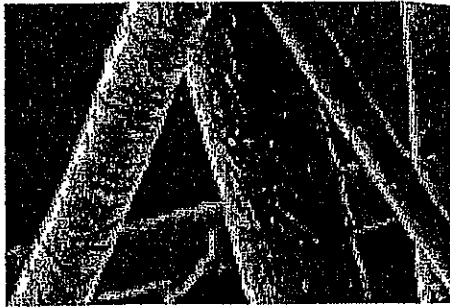
Coronal (mouse)



Spinous (cat)



Imbricate (human)

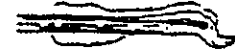


Hair Roots

Mature human root



Human root with follicular tag - forcibly removed



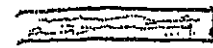
Cat root - often frayed



Dog root - often spade shaped



Hair root missing



Medullary Index

is the ratio of:

$$\frac{\text{diameter of medulla}}{\text{diameter of hair}} = \text{medullary index}$$



← The medulla is about 1/3 of the thickness of the whole hair.

Medulla Pattern

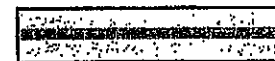
Fragmented



Intermittant



Continuous

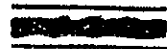


Absent



Medulla type

Amorphous (human)



Lattice (deer family)



Vacuolated (dog & fox family)



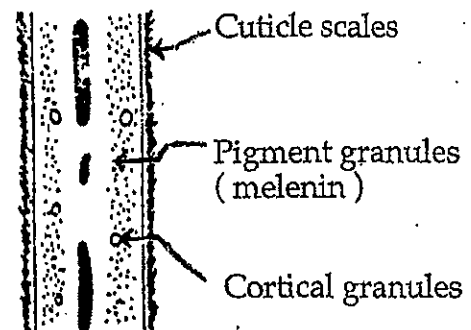
Unicertial (rabbit family)



Multicertial (rabbit family)



Cortex





All hairs have the following common elements: a tough outer cuticular scale structure, and a rigid intermediate cortex structure. See Figure 2.

Cuticle scales cover the outside of the hair and point towards the tip. Cuticular scales vary widely between animals.

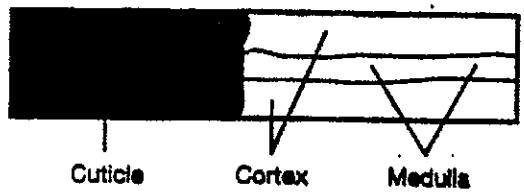


Figure 2.

The cortex gives hair its shape. Located in the cortex are pigments that give hair its color. Running down the center are a group of cells that define the medulla. There are four types of medullas: continuous, interrupted, fragmented, and absent—as shown in Figure 3.

Hummer



Figure 3.

The shape of hair can be straight, curly, or kinky. This depends on its roundness. Hair that is round will be straight, oval will be curly, and excessively oval will be kinky as shown below.



Figure 4. End Views

The medullary index is the ratio of:

$$\frac{\text{diameter of medulla}}{\text{diameter of hair}} = \text{medullary index}$$

If the hair diameter is 9 centimeters and the medulla is 3, then you would have:

$$\text{Medullary Index} = \frac{3 \text{ centimeters}}{9 \text{ centimeters}} = 1/3$$

Materials Provided:

- Microscope
- Glass microscope slide
- Cover slips
- Ruler
- White paper
- Several hair samples: yours, lab partner, animal's (dog or cat)
- Video microscope camera and monitor (if available)

Lab Safety:

Always assume that chemicals are potentially dangerous when working with them. You should always follow the safety instructions provided.



They are for your safety. If an accident was predictable, then it wouldn't be an accident.



