

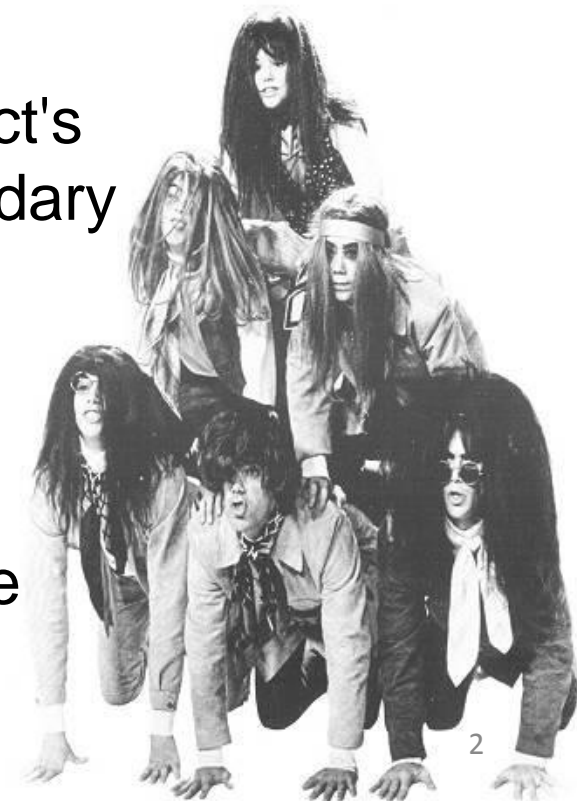
# Hairs, Fibers, and Paint

## Chapter 8

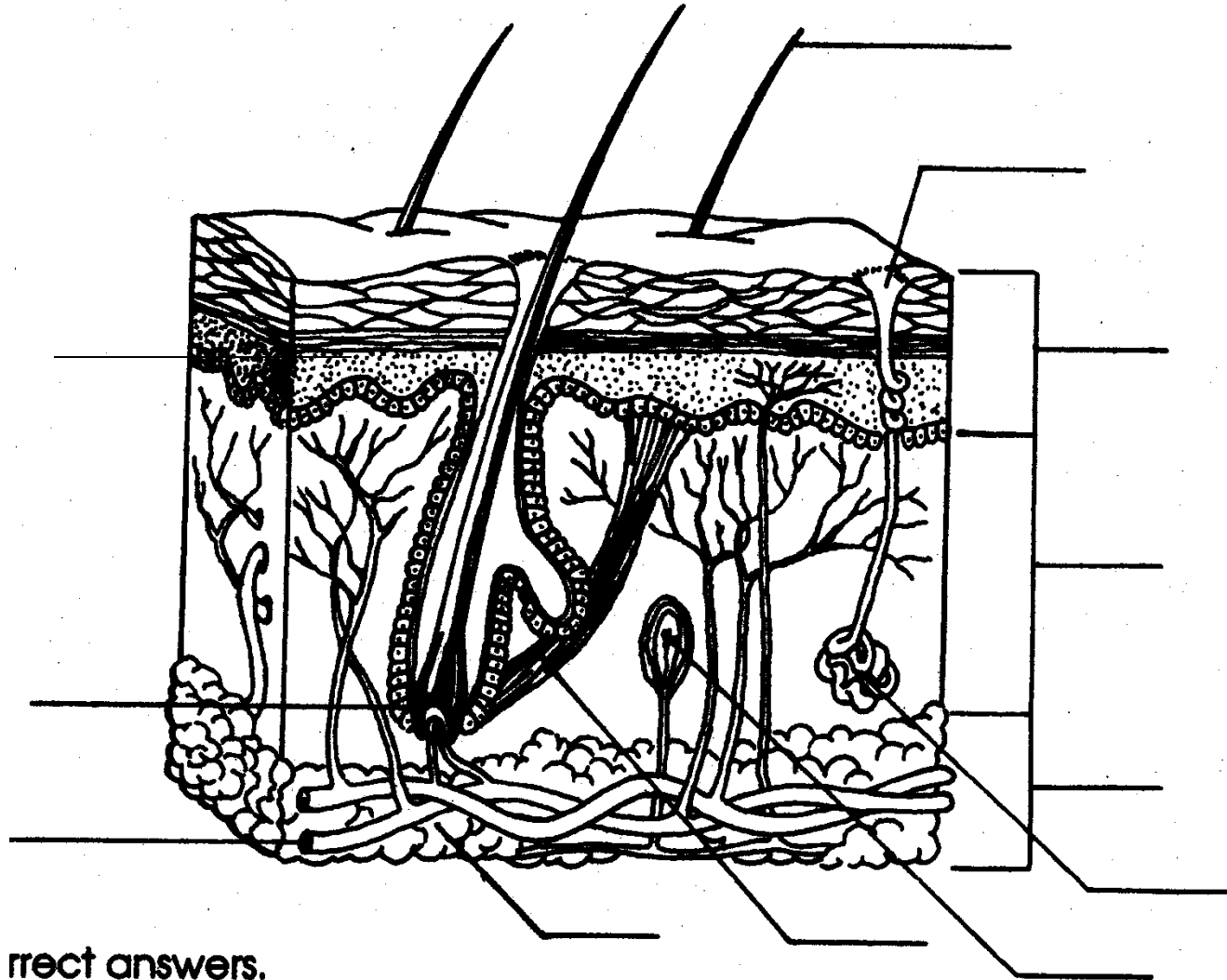


# Why Study Hair?

- Approximately 100 head hairs are shed by an individual each day.
- These hairs are shed on clothing and on items in the environment.
- Contact between a victim and a suspect's environment can easily cause a secondary transfer of hair.
- Class Characteristic
- Can be used as corroborative evidence



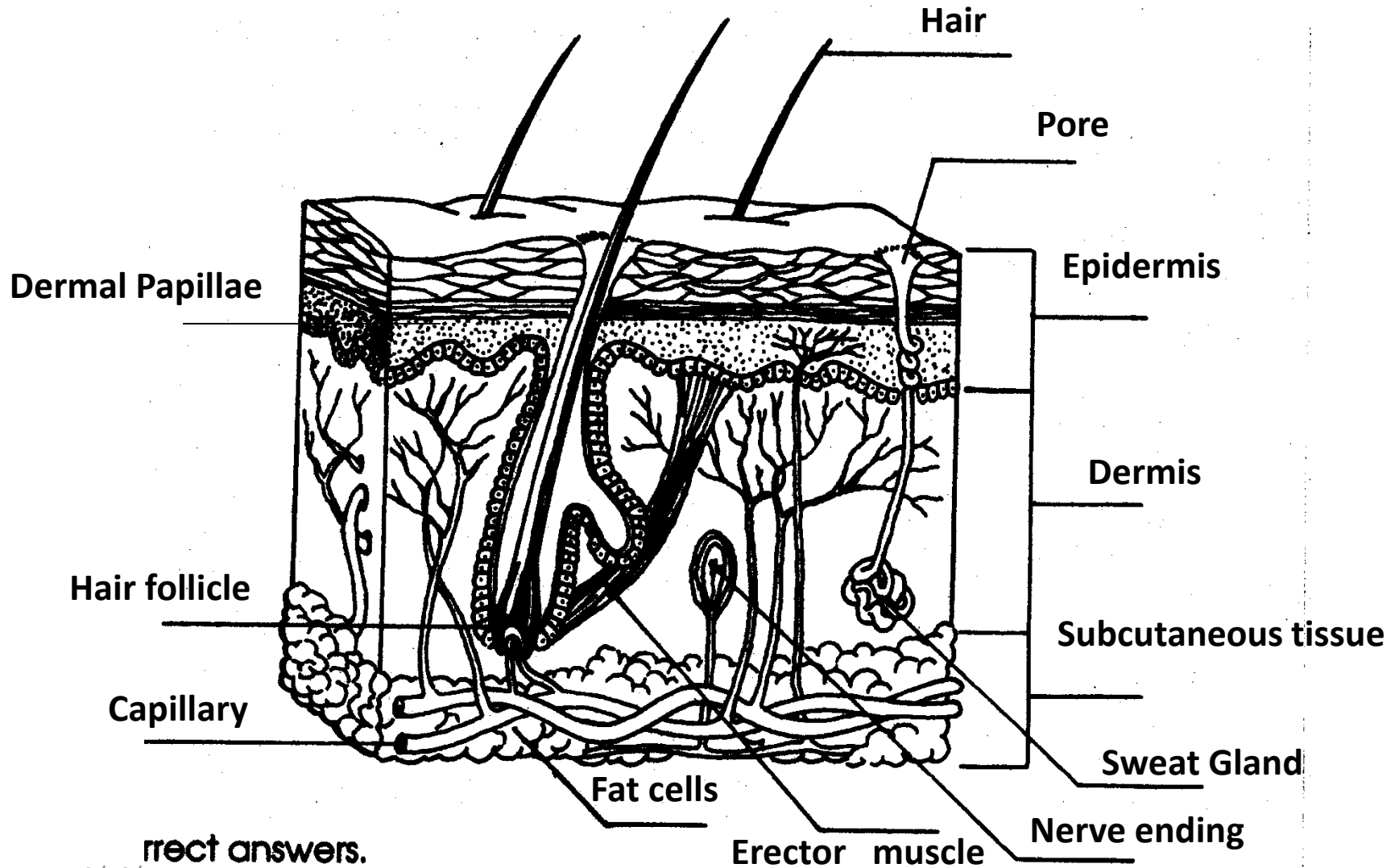
# The Skin



rect answers.

12/10/2017

# The Skin



rect answers.

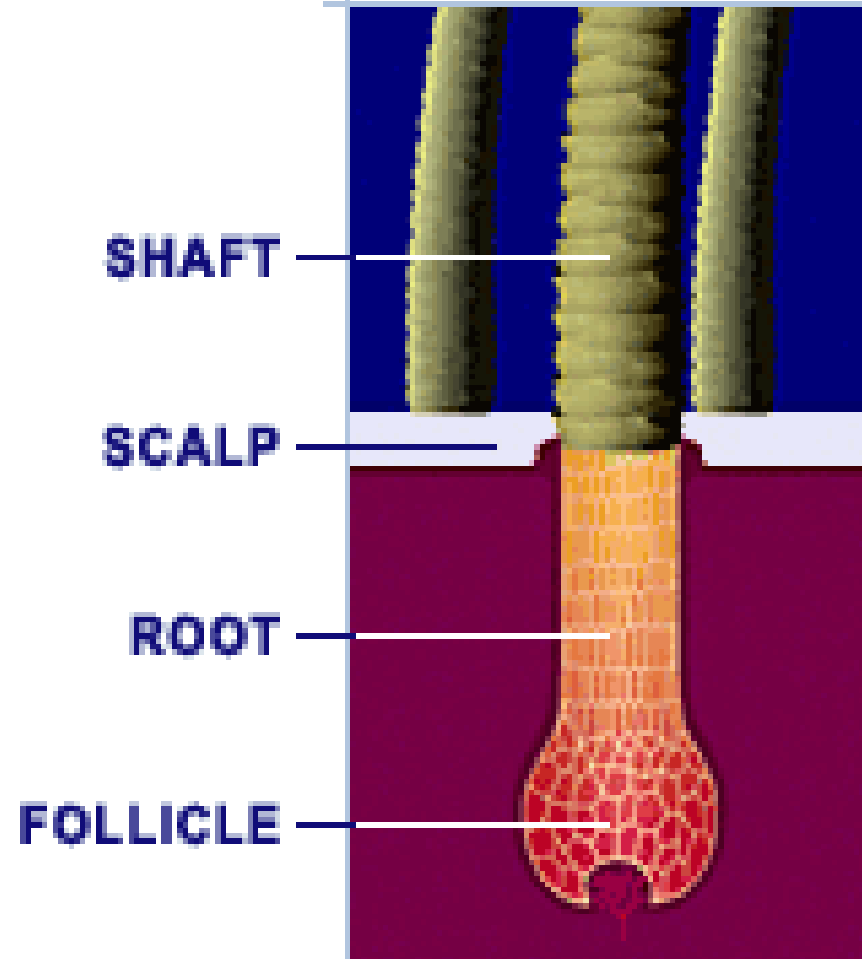
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# What Can Be Learned from Hair

- Human or animal?
- Race.
- Body area of origin.
- Shed or forcibly removed.
- Disease.
- Comparison to known samples.

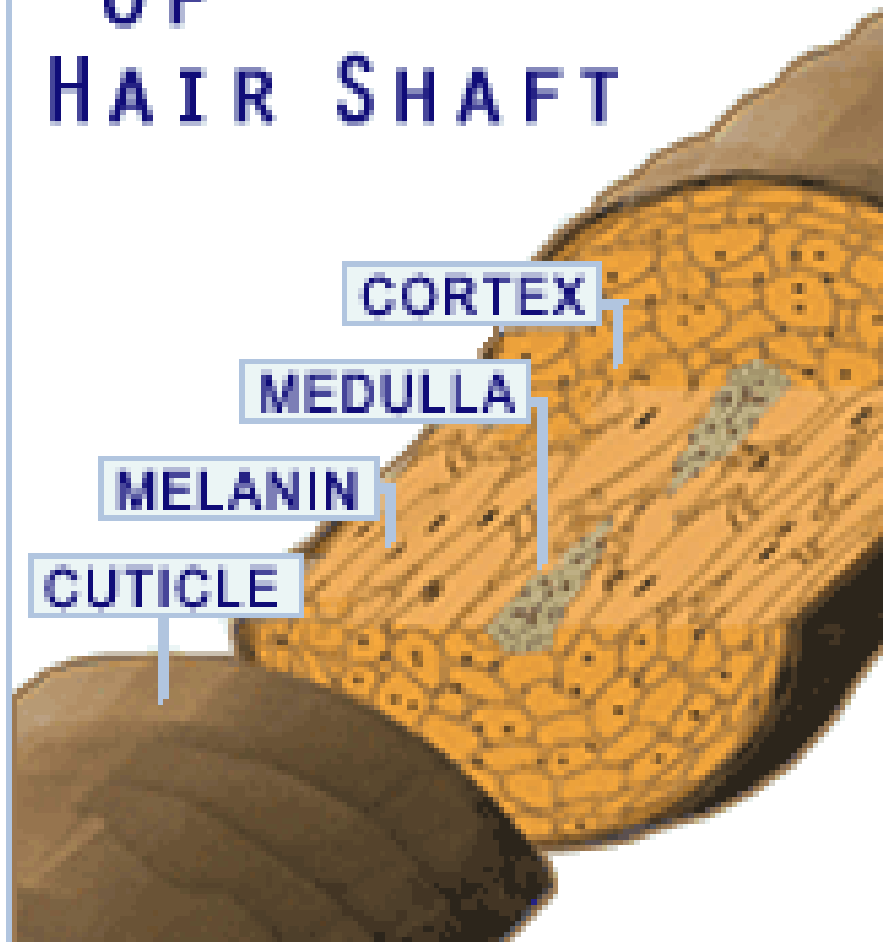
# The Structure of Hair:

## HAIR SHAFT AND FOLLICLE



# Cross Section of Hair

## CROSS SECTION OF HAIR SHAFT



# Forensic Files - Season 8, Episode 18: Hair of the Dog

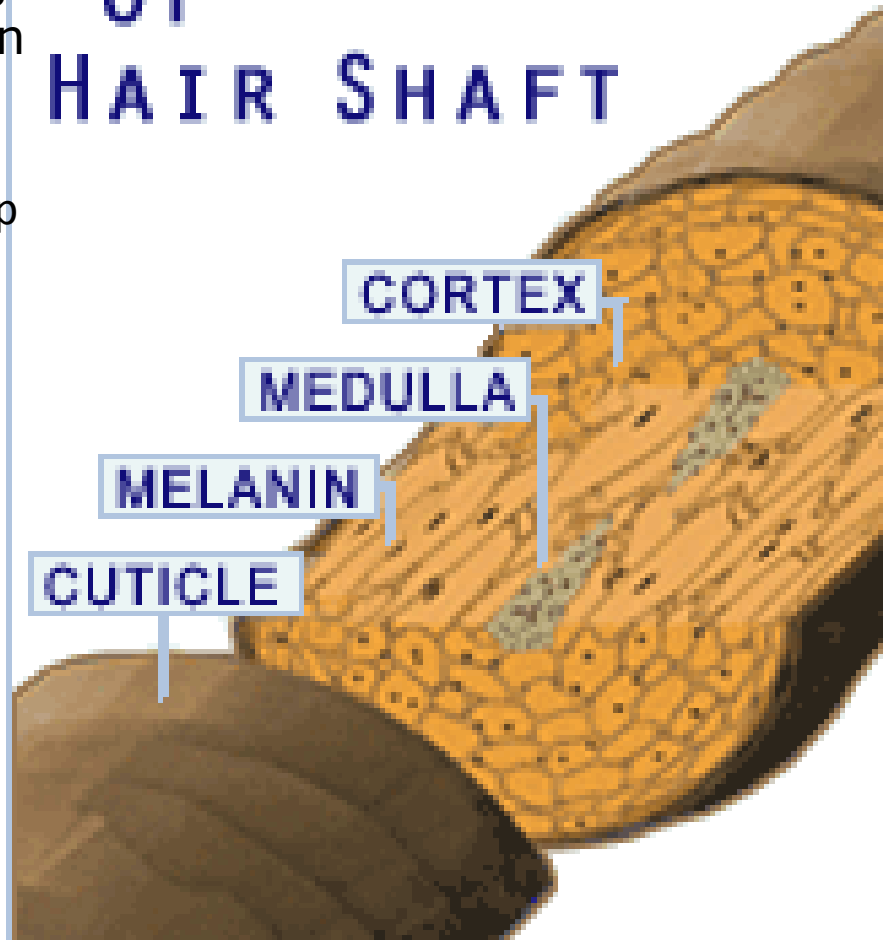


# Cross Section of Hair

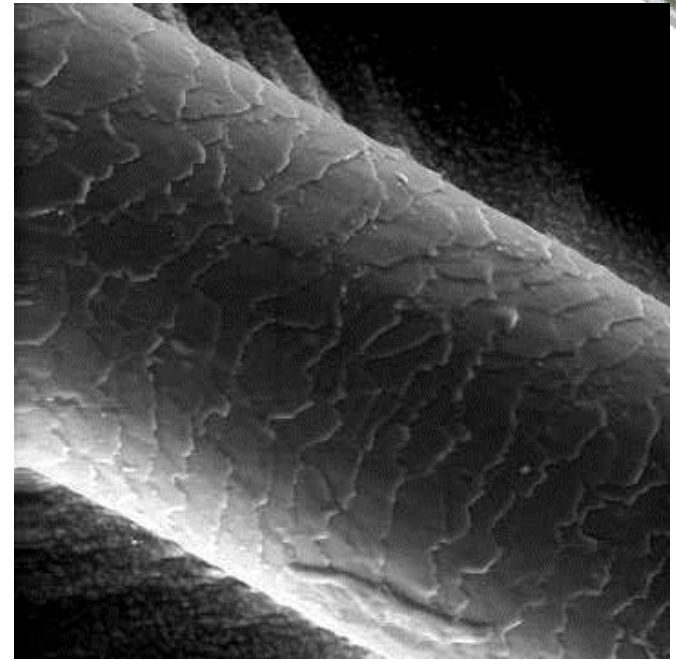
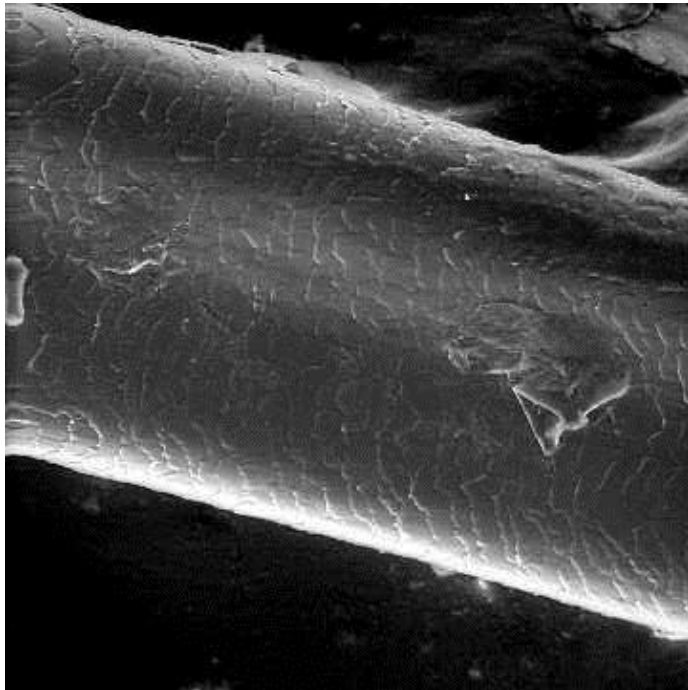
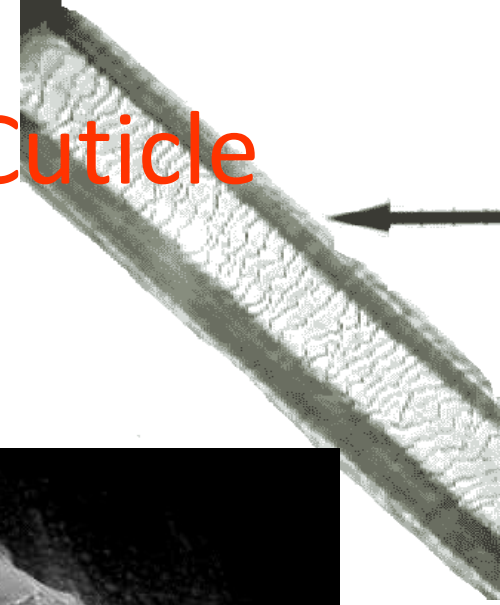
## Cuticle:

- Translucent outer layer, which protects the hair.
- Flat cells layered in an overlapping formation that looks like shingles on a roof.
- Overlapping scales always point towards tip end of hair
- Scale pattern allows for differentiation of species

## CROSS SECTION OF HAIR SHAFT



# Three major parts of Hair: **Cuticle**



# Three major parts of Hair: **Cuticle**

**Mosaic**



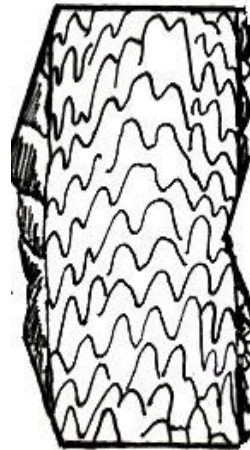
**Pectinate**



**Imbricate**



**Petal**



**Diamond  
Petal**



**Chevron**



# Cross Section of Hair

## Cortex:

- Middle layer made up of long thin cells firmly attached to each other and arranged lengthwise.
- Location where nature creates natural hair coloring
  - Has pigment granules
  - Compare color, shape, distribution

## CROSS SECTION OF HAIR SHAFT



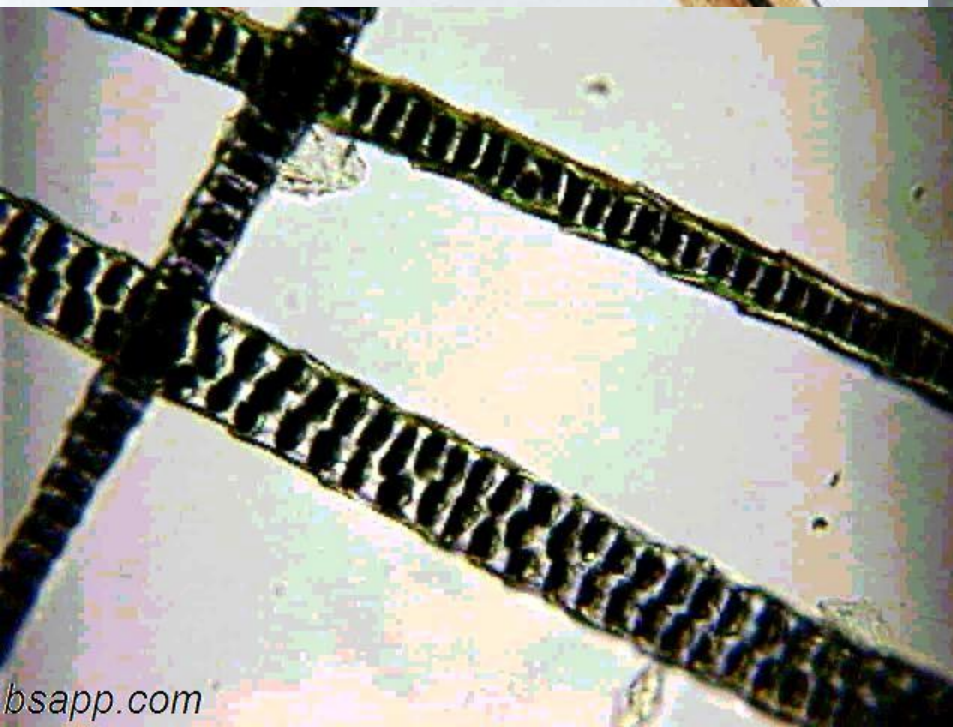
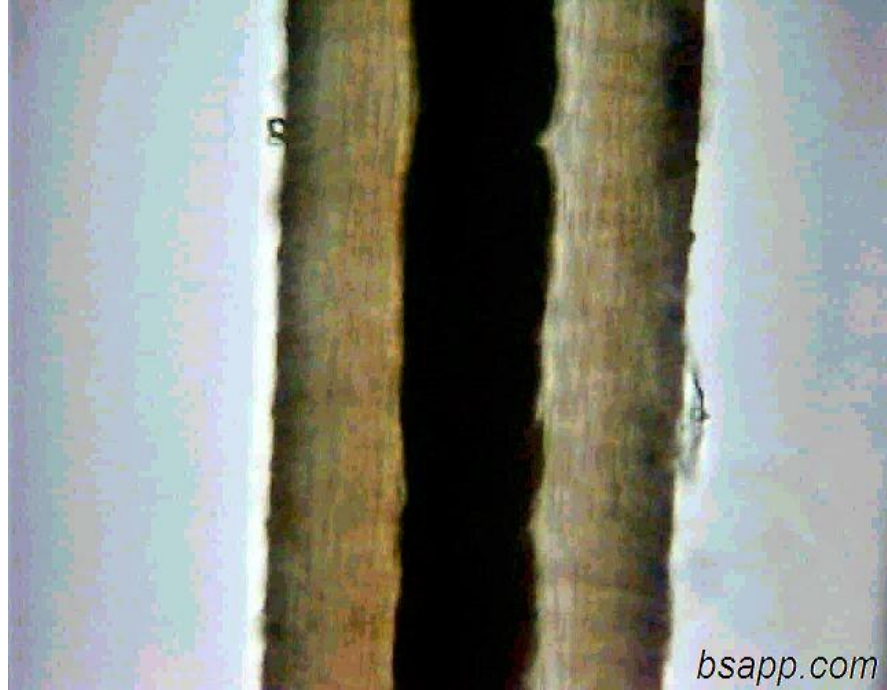
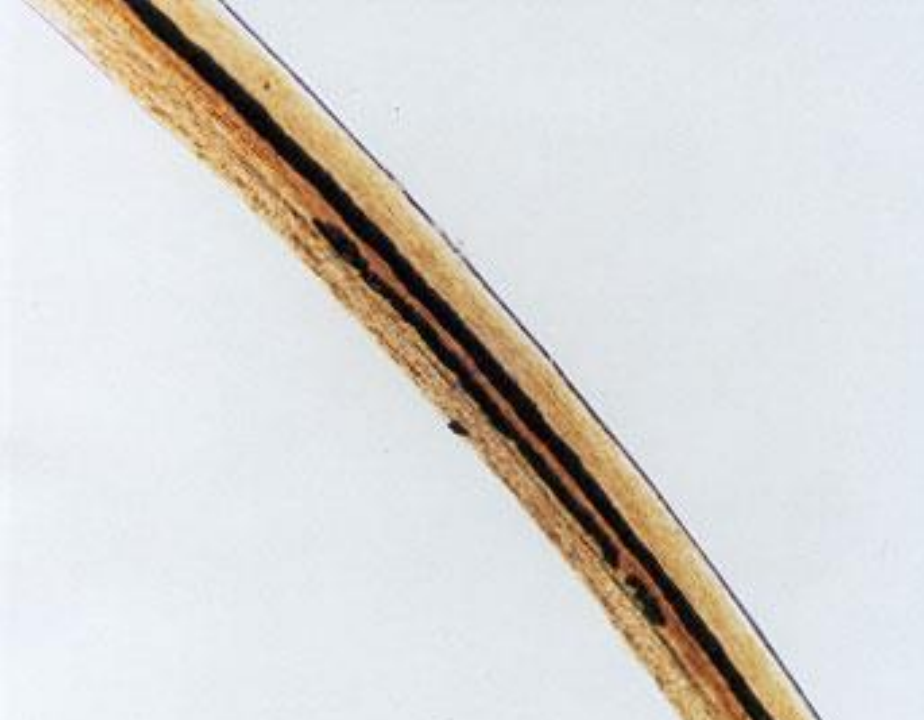
# Cross Section of Hair

## Medulla:

- Central core of the hair.
- Composed of soft keratin.
- Medullary index is how much of diameter of hair medulla takes up
  - Human  $<1/3$
  - Other animals  $>1/2$
  - Can vary even in same individual

## CROSS SECTION OF HAIR SHAFT





# Animal hair vs. Human

**Muskrat**



**Deer**



**Human**



# To the Scopes!!!!!!

- Make a wet mount of each species
  - Try to get both ends under the coverslip
- Draw a sample of each hair. If possible include:
  - Cuticle pattern
  - Medulla pattern
  - Root hair pattern
  - Estimate of medullary index



# Human vs. Human

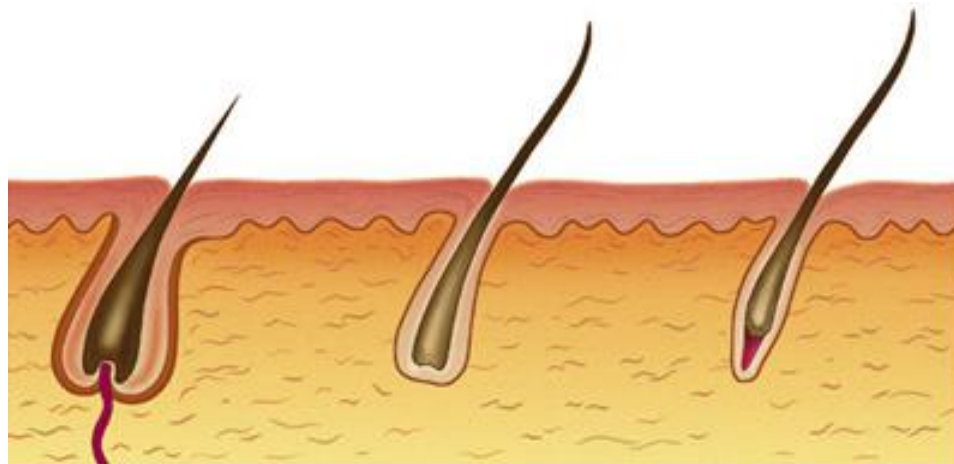
- All unknowns are compared to:
- KNOWN standards: color, length, shape and diameter.
- Concentration of Medullary/ cortex pigments
- Growth after Dyed or bleached?
  - Dyed (color) throughout
  - Bleached: pigments removed provides a yellowish tint



# Hair Growth

Three developmental stages:

1. Anagen phase, *Active growth phase*
2. Catagen phase, *Regressive phase*
3. Telogen phase, *Resting phase*



# Hair Growth

- Anagen has hair attached to follicle for continued growth
  - If this hair pulled usually has a piece of tissue attached
  - DNA analysis can individualize
- Catagen has slight continued growth
- Telogen is when growth phase ends
  - Hair will eventually pushed out causing shedding
- Hair grows about 1cm per month

## Shedding vs. Removal By Force

- Presence of follicular tissue on root is indicative of forcible removal
- Can occur because of a comb **or** a person

# Hair Removal



Naturally shed hairs, such as a head hair dislodged through combing, display undamaged, club-shaped roots.



A hair forcibly removed from the scalp will exhibit stretching and damage to the root area.



Forcibly removed hairs may have tissue attached.

# Racial Determination

–African American

- kinky with dense uneven pigment
- flat to oval in shape

–Caucasian

- straight or wavy fairly evenly distributed pigment
- oval to round shape

# Body Area Determination

**Head Hairs:** usually the longest

**Characterized:**

- a uniform diameter
- Often a cut tip, often cut with scissors, razors, or clippers.
- Appearance of hair dyes, rinses, permanents, frosts, and other chemical applications.
- Environmental alterations: sunlight, wind, dryness



**A hair showing buckling**

# Body Area Determination

## Pubic Hairs:

### Characteristics:

- considerable variation exists between individuals in the population
- generally coarse and wiry
- they exhibit considerable diameter variation or buckling and often have a continuous to discontinuous medulla.
- are not subject to as much change over time, and because of this, a sample taken a year or more after a crime may still be suitable for meaningful comparison purposes.



**A hair showing buckling**



# Facial Hairs

Facial hairs are more commonly called beard hairs or mustache hairs.

## Characteristics:

- are coarse in appearance and can have a triangular cross section.
- Other characteristics include a wide medulla and a razor-cut tip.



# Limb Hairs

Hairs from the legs and arms constitute limb hairs.

## Characteristics:

- shorter in length, arc-like in shape, and often abraded or tapered at the tips.
- the pigment in limb hair is generally granular in appearance
- medulla is trace to discontinuous.



# Collection of Hair Evidence

- Questioned hairs must be accompanied with
  - an adequate number of control sample hairs from victim
  - from others suspected of depositing hair at Crime scene
- **Representative control samples**
  - 50 full-length hairs from all areas of scalp
  - 24 full-length pubic hairs