LEARNING OBJECTIVES
1. Describe the cuticle, cortex, and medulla of hair.
2. Describe the three phases of hair growth.
3. Explain the distinction between animal and human hairs.
4. List hair features that are useful for the microscopic comparison of human hairs.
5. Explain the proper collection of hair evidence.
6. Describe the role of DNA typing in hair comparisons.

Questions: please answer using complete thoughts…

1. How is the hair cuticle used to identify different animal species?
The cuticle is formed by overlapping scales that occur in a variety of patterns in different animal species. The distinctive scale pattern formed by animal hair makes it an important feature for species identification.

2. What aspect of the hair cortex is most important for the criminalist and why?
The cortex derives its major forensic importance from the fact that it is embedded with the pigment granules that impart hair with color. The color, shape, and distribution of these granules provide the criminalist with important points of comparison among the hairs of different individuals.

3. What is the follicular tag and why is it important to forensic scientists studying hair?
The follicular tag is a translucent piece of tissue surrounding the hair’s shaft near the root. It contains the richest source of DNA associated with a hair.

4. In comparing two hair samples, what aspects of the hair is the criminalist particularly interested in matching? What other features of hair are important to compare?
In comparing hair, the criminalist is particularly interested in matching the color, length, and diameter. Other important features to compare are the presence or absence of a medulla and the distribution, shape, and color intensity of the pigment granules in the cortex.
5. Which of the following cannot be confidently determined by a microscopic examination of hair: age, sex, racial origin, the part of the body from which the hair came, or whether the hair was pulled out or fell out?

Microscopic examination of hair cannot confidently identify a subject’s age or sex.

6. Why are most hair specimens collected at crime scenes not good sources of DNA?

Most hairs collected at crime scenes are naturally shed and thus in the telogen stage of growth. At this stage of growth the hairs have too little nuclear DNA to successfully type.

7. What type of hair specimens are potentially the richest source of nuclear DNA and why?

Hairs forcibly removed from the head are the richest potential sources of DNA because they often have a follicular tag attached.

8. What is mitochondrial DNA and why is it useful in analyzing hair samples?

Mitochondrial DNA is DNA present outside the nucleus of a cell that is inherited only from the mother. It is useful in analyzing hair because there are many more copies of mitochondrial DNA located in samples such as hair cells, which otherwise contain a limited amount of nuclear DNA.

9. List three important considerations when submitting hair samples to a crime laboratory.

Questioned hairs submitted to a crime laboratory for examination must be accompanied by an adequate number of standard/reference samples from the victim and from individuals suspected of being present at the crime scene. Questioned and standard/reference hairs must come from the same area of the body. The collection of standard/reference hairs must be carried out in a way that ensures a representative sampling of hair from any one area of the body.
1. The portion of the hair containing its scales is the:
   a. Cortex
   b. Cuticle
   c. Medulla
   d. Root
   e. Follicle

2. A human head hair is best characterized by:
   a. The absence of a cortex
   b. Its scale pattern
   c. A medulla that is more than half the overall diameter of the hair shaft
   d. A medulla that is absent or is less than one-third the overall diameter of
      the hair shaft
   e. A continuous or interrupted medulla

3. Hair can best be characterized as originating from an animal by examining:
   a. The medulla
   b. The cuticle
   c. Both the medulla and cuticle
   d. Its color
   e. Its scale structure

4. Which statement is true?
   a. The racial origin of hair can always be identified.
   b. Hair can be individualized through its trace elemental composition.
   c. Hair is routinely examined to determine sex.
   d. Through a microscopic examination a single hair can be individualized to
      one person.
   e. Two hairs from the same head may not have the same morphological
      characteristics.

5. Which of the following cannot be answered with a microscopic examination of
   hair?
   a. Whether a hair came from a 25-year-old or an infant
   b. Whether a hair is from a man or a woman
   c. Whether a hair is from a scalp or a beard
   d. Whether the hair is consistent with Caucasian or Negroid hair
   e. Whether a hair has been dyed or chemically treated