

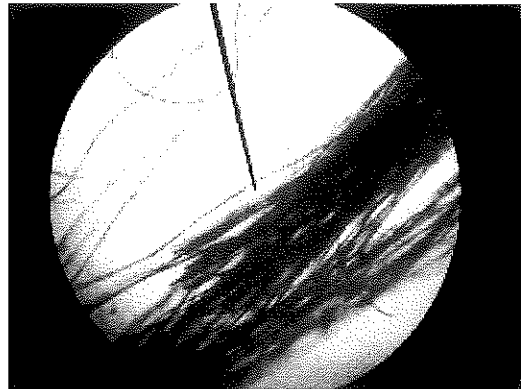
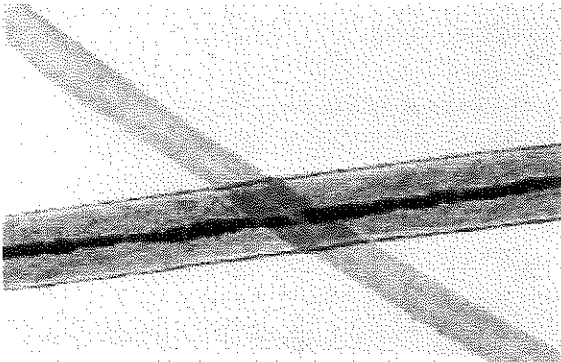
Unit 4 Guide: Hair and Fiber Evidence

Learning Goals:

- Defend the importance of hair as evidence.
- Describe the form and function of hair.
- Determine how hair can be a chemical indicator used in an investigation.
- Demonstrate how hair is collected and observed during investigations.
- Illustrate and label the anatomy of a hair and the hair follicle.
- List and describe the three phases of hair growth.
- Compare and contrast between human and animal hair.
- Perform hair collection from a mock crime scene.
- Communicate how fibers are used as evidence.
- Describe some of the sources of fibers that may be recovered at a crime scene.
- Explain fiber morphology.
- Discuss fiber transfer.
- Determine different ways to match fibers.
- Differentiate between natural and manufactured fibers.
- List fibers that are important and useful in forensics.
- Perform a fiber collection from a mock crime scene.

Key terms: hair, fibers, hair follicle, Locard Exchange principal, morphology, polymers, cortex, medulla, cuticle, keratin, cortical fusi, undulation, micrometers, anagen phase, catagen phase, telogen phase, association, questioned, exemplar, metabolites, false positive, textiles, fabric, filaments, inorganic, polypeptide, plastics, density

Reading for Understanding: Chapters 5 & 6



Hair Vocabulary

1. Cuticle
2. Cortex
3. Medulla
4. 3 patterns for cuticle scales
5. Melanin
6. 5 types of medulla
7. Medullary index
8. Medullary index for humans
9. Medullary index for animals
10. 3 hair shapes
11. Anagen
12. Catagen
13. Telogen
14. Hair root or follicle
15. Nuclear DNA
16. Mitochondrial DNA
17. Dyed hair
18. Bleached hair
19. Hair Collection

Chapter 5 Hair--Outline

I. Introduction

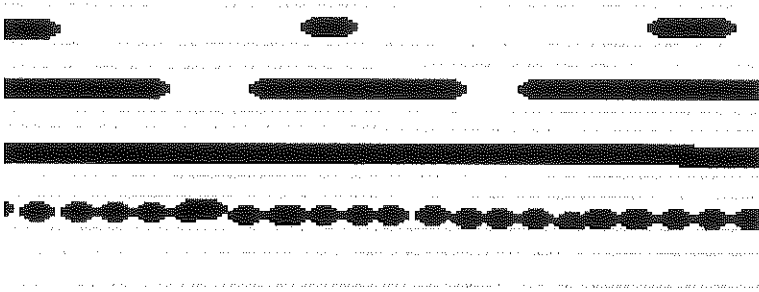
II. From hair one can determine:

III. Hair Shaft:

A. The Cuticle :

B. The Cortex:

C. The Medulla: Types:



Medullary Index-

IV. Hair Shape:

V. Hair Growth:

VI. The Root:

VII. Hair Comparison:

VIII. DNA from Hair:

IX. Collection of Hair:

X. Hair Toxicology:

Fibers_Outline

I. Fibers

II. Fabric

Types of Fibers

Synthetic

Natural

III. Two Classifications of Fibers (Natural and Synthetic)

IV. Fabric Production-

V. Testing for Identification

VI. Identification and Comparison of Fibers

VII. Collection of Fiber Evidence

VIII. Probability formula: write this down with the example given.

Name _____ Date _____ Pd. _____

Hair Notes Questions

1. What remains the hair's most characteristic forensic feature?
2. The shaft is composed of what three layers (describe each layer)?
3. The scales that make up the cuticle point to what part of the hair?
4. The cortex gives the hair its _____. The granules in the cortex are called _____ and determine _____.
5. Name, describe, and sketch the four medulla patterns.

6. The medullary index is determined by measuring the diameter of the _____ and dividing it by the diameter of the _____.

What is it for human hair?

For animals _____

7. What is the main purpose for examining a hair found at the crime scene?

8. What is the approximate growth rate for hair per month?

_____ Cm _____ in.

9. Can you distinguish a hair that has been bleached or dyed from a natural

hair? _____ How?

10. What kind of DNA is in the root of a hair and what information does this give you.

11. What kind of DNA is in the hair shaft and what information does this give you?

12. Control samples should be collected from what sources?

13. How many hairs should be collected as a control sample from the

Scalp? _____ Pubic area _____

Name _____ Fiber Questions Date _____ pd. _____

1. Are Fibers usually individual or class evidence? Why?
2. Name one natural fiber that is made from cellulose or vegetable and not chemically altered.
3. List 4 synthetic fibers.
4. List 3 natural fibers that are made from minerals.
5. Give 2 natural fibers made from proteins.
6. What are the two tests we did for identification in the fiber lab?
7. What are 6 other tests that can be run to identify a fiber?

8. A white cotton fiber was found on the red shirt of a victim. A white fiber was taken from a suspect's sweatshirt. After testing 550 white sweatshirts, the lab found that 55 fibers matched. What is the probability that the crime scene fiber and that of the suspect matched simply by chance?

9. A red cotton fiber was found on the white pants of a victim. A red fiber was taken from a suspect's jacket. After testing 300 red jackets, the lab found that 60 fibers matched. What is the probability that the crime scene fiber and that of the suspect matched simply by chance?

10. How can you test a dye from a particular fiber?

11. What is the most common type of natural fiber? _____

12. What is the most widely used manmade fiber? _____

13. Can a piece of fiber be individualized to a particular garment? Why or Why not?

14. Can a piece of fabric be individualized to a particular garment? Why or Why not?

Name _____

Hair and Fiber Review

Date _____ Pd _____

1. How is hair used as class evidence?
Individual evidence?
2. Why do you think we collect over 50 head hairs from a control sample?
3. Can you analyze hair for drug use or poisons?
4. If a victim had dyed their hair and the dyed part was 4 cm from the root, how long had it been since the victim dyed their hair.
5. Controls for hair examination are collected from where or who?
6. Microscopic examination of hair can determine what?
7. The outer layer of the hair shaft is the _____, Describe it.
8. The middle layer of the cortex is the _____, Describe it.
9. The inner layer of the hair shaft is the _____, Describe it
10. Generally, a human hair can be distinguished from an animal hair by examining what part?
11. Human hair can be characterized by having a medullary index of what? _____
What types of medulla can humans have?
Animal hair medullary index? _____
12. Describe the phases of hair growth?
13. What are the 5 types of medullas?
14. Nuclear DNA can be identified from what part of the hair? _____
What does nuclear DNA show that can be used in court?
Mitochondrial DNA is what part of hair? _____ How is it used in court?

15. An unidentified hair is examined . How do you know if it has been dyed or bleached?

16. What is the average growth of hair per month? _____

17. List 6 synthetic fibers.

18. List 6 natural fibers and their sources.

19. Is fiber usually class or individual evidence? _____
20. What are the two tests we did for identification in the fiber lab?

21. What are 6 other tests that can be run to identify a fiber?

22. A white cotton fiber was found on the red shirt of a victim. A white fiber was taken from a suspect's sweatshirt. After testing 250 white sweat-shirts, the lab found that 10 fibers matched. What is the probability that the crime scene fiber and that of the suspect matched simply by chance?

23. How can you test a dye from a particular fiber?

24. What is the most common type of natural fiber? _____
25. What is the most widely used manmade fiber? _____

26. Can a piece of fiber be individualized to a particular garment? Why or Why not?

27. Can a piece of fabric be individualized to a particular garment? Why or Why not?