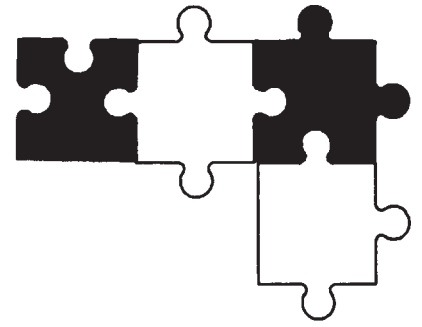




## Activity 27

# WHOSE HAIR IS IT?



### STUDY QUESTION:

What differences are there between human and animal hair?  
How do forensic science laboratories use this information to solve crimes?

### THE ACTIVITY:

Students will identify different samples from various agricultural animals, and use this information to solve a fictitious crime.

### CURRICULUM FIT:

#### DIVISION FOUR - SCIENCE

- Develop use of microscope
- Develop process skills to solve a problem
- Encourage further interest in science and its applications

### AGRICULTURE CONCEPTS:

Diversity

### PURPOSE:

- To acquaint students with characteristics (hair) of different agricultural animals.
- To gain experience in solving problems through science.
- To spark student interest in different branches of science.

### COGNITIVE LEVELS:

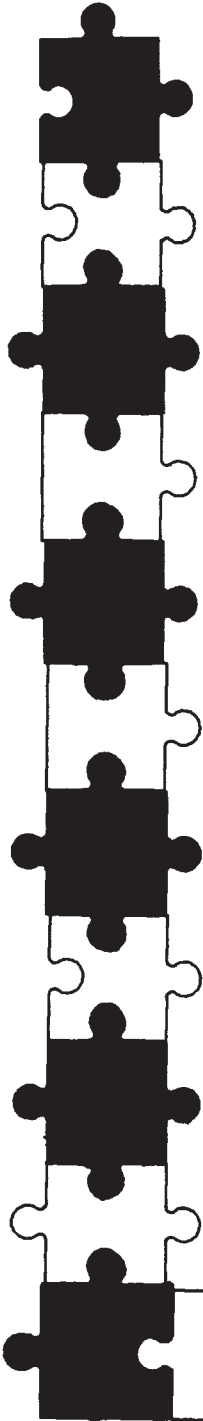
Knowledge, comprehension, application, evaluation

### MATERIALS REQUIRED:

Resource and task sheets provided.  
Animal hair samples.  
Microscopes.  
Slides.  
Cover slips.

### TIME REQUIRED:

One to two class periods.



# BACKGROUND - For the Teacher

Many crimes result in the criminal leaving clothing fibers, hair samples, or other physical evidence at the scene of the crime. With the use of a microscope and more sophisticated methods, a forensic scientist can generally solve the crime.

Hair consists of three parts: the **cortex**, or main part of the shaft, the **medulla**, or central core, and the **cuticle**, or surface scale patterns. The medulla varies with species, so it is most useful for identification purposes.

Animal hair can be distinguished from human hair by using the **medullar index (MI)**. The MI is the width of the medulla divided by the width of the cortex. Human hair has an  $MI < 1/3$ , while animal hair has an MI up to  $2/3$ . Cows have an MI of about  $1/2$ , while most other animals have a larger MI.

Medullas can be classified as absent, continuous, patterned, or fragmented. Human hair normally has fragmented medulla but never patterned medulla. Most animal hair contains continuous or patterned medullas. Specific species of animals can be identified by comparing with a reference.

In this lesson, students have the opportunity to practice microscope and observation skills. They are exposed to a fascinating branch of science while experiencing its practical applications, and they will become more familiar with one identifiable feature of agricultural animals.

**NOTE:** *This lesson and background material was adapted from the following article:*  
"Forensic Science in the Classroom: Hair Identification,"  
Elhannan L. Keller, Science Activities, Feb/March 1987 pp. 31-34.

## PROCEDURE

### Part 1

#### Preparation

1. Gather animal hair samples (enough so each student has 3 to 5 hairs to look at plus samples for unknowns).
2. Photocopy task sheets and resource sheet for each student (or prepare transparency of resource sheet).

### Part 2

#### Introduction

3. Explain nature of study.
4. Review background material.
5. Distribute task (and resource) sheets.

### Part 3 (Section 1)

#### Activity

6. Have each student obtain hair samples for identification, and gather other necessary materials (or work in pairs if not enough microscopes).
7. Students should prepare wet mount slides of hair samples and view each under LOW and HIGH power.
8. Students record information on first task sheet (diagrams of each sample and MI measurements).

### (Section 2)

9. After completing Section 1, make up and explain a simple crime scenario to students (you may decide to work with several different crimes at one time).
10. Students obtain samples of unknown animal hairs and attempt to solve the crime.
11. Students finish completing second task sheet.

### Part 4

#### Conclusion

12. Have students report findings.
13. Discuss the process used to solve the problem.

## **DISCUSSION QUESTIONS**

1. How does the structure of hair help in protecting an organism from heat and cold?
2. What differences/similarities were observed in different genus within a species?
3. Which animal(s) had the smallest/biggest MI?

## **RELATED ACTIVITIES**

1. Have students study the bleaching of hair with hydrogen peroxide on hair of different colors.
2. Study scale patterns on cuticle surface. Coat microscope slide (and hair) with clear nail polish. When the polish has dried, remove the hair, leaving behind a cast mold to observe the cuticle scales.

*By Shelley Kudera*

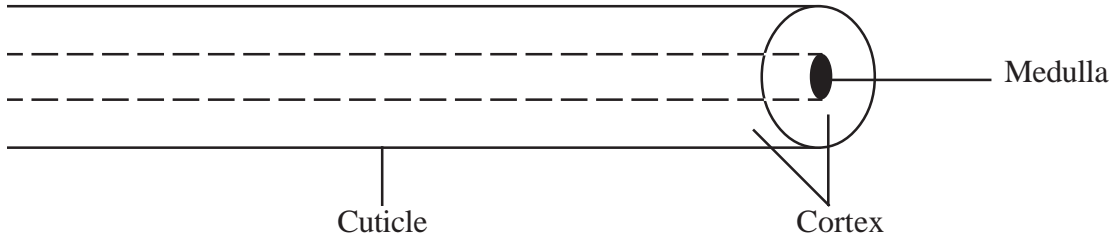


# STUDENT RESOURCE

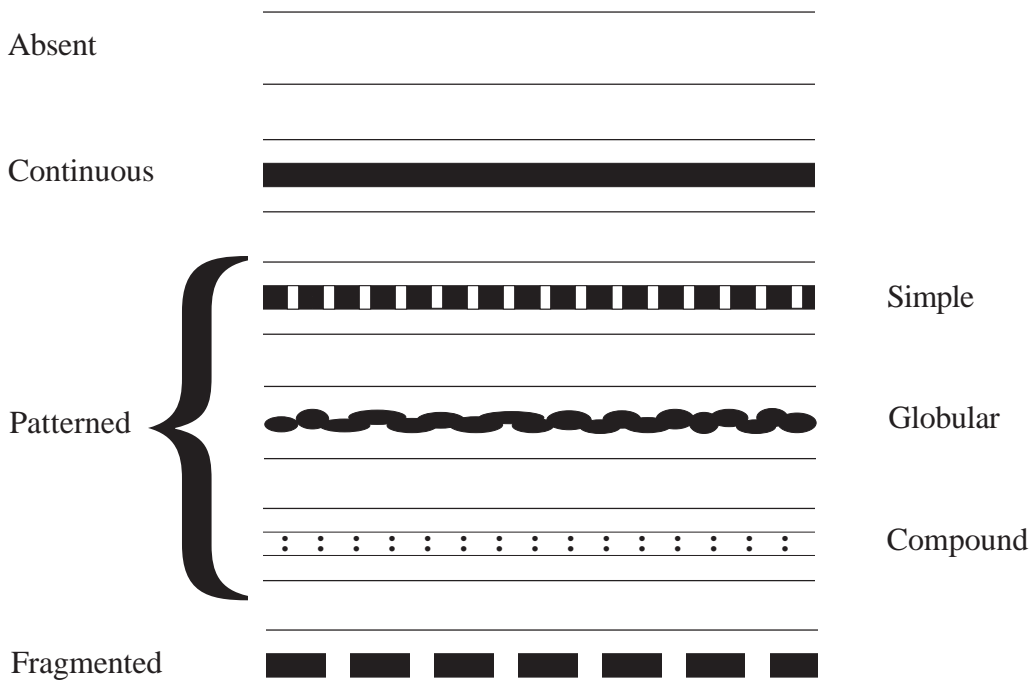
## SHEET ONE --

### Structure of Hair and Types of Medulla

#### Structure of Hair



#### Types of Medulla



#### Calculation of MI (medullar index)



$$MI = \frac{\text{width of medulla}}{\text{width of cortex}} = \frac{1}{3}$$

# STUDENT RESOURCE

## TASK SHEET ONE --



### Known Hair Samples

#### HUMAN HAIR

Low Power

High Power

--	--

MI = \_\_\_\_\_

#### ANIMAL HAIR - SAMPLE 1 \_\_\_\_\_

Low Power

High Power

--	--

MI = \_\_\_\_\_

#### ANIMAL HAIR - SAMPLE 2 \_\_\_\_\_

Low Power

High Power

--	--

MI = \_\_\_\_\_

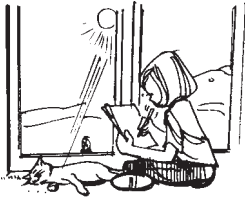
#### ANIMAL HAIR - SAMPLE 3 \_\_\_\_\_

Low Power

High Power

--	--

MI = \_\_\_\_\_



# STUDENT RESOURCE

## TASK SHEET ONE --

### Known Hair Samples (cont'd)

ANIMAL HAIR - SAMPLE 4 \_\_\_\_\_

Low Power

High Power

--	--

MI = \_\_\_\_\_

ANIMAL HAIR - SAMPLE 5 \_\_\_\_\_

Low Power

High Power

--	--

MI = \_\_\_\_\_

# STUDENT RESOURCE

## TASK SHEET TWO --



### Unknown Hair Samples - Solving the Crime

SAMPLE 1 \_\_\_\_\_

Low Power

High Power

--	--

MI = \_\_\_\_\_

SAMPLE 2 \_\_\_\_\_

Low Power

High Power

--	--

MI = \_\_\_\_\_

SAMPLE 3 \_\_\_\_\_

Low Power

High Power

--	--

MI = \_\_\_\_\_



**STUDENT RESOURCE**  
**TASK SHEET TWO -- (cont'd)**  
**Unknown Hair Samples - Solving the Crime**

**SAMPLE 4** \_\_\_\_\_

**Low Power**

**High Power**

--	--

**MI =** \_\_\_\_\_

**SAMPLE 5** \_\_\_\_\_

**Low Power**

**High Power**

--	--

**MI =** \_\_\_\_\_

**A) The Culprit is**

---

---

**B) State the supporting evidence**

---

---

---

---

---

---

---

---

---

---