



## DNA FINGERPRINTING

### Title of Lesson: DNA Fingerprinting

#### Designed by

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#### Background:

The students will be given a crime scenario that involves collecting DNA Fingerprinting information from blood collected at the crime scene. They will analyze electrophoresis results from three suspects and the crime scene blood DNA to determine who committed the crime.

#### Description of Audience:

This biotechnology/bioinformatics activity is designed for use by Biology students in grades 9-12.

#### State Standards:

This biotechnology/bioinformatics activity fulfills the following State of California Science Standards:

- Standard 4: Genes are a set of instructions encoded in the DNA sequence of each organism.
- Standard 5d: Students know how basic DNA technology (restriction digest, electrophoresis) is used.

#### National Standards:

This biotechnology/bioinformatics activity fulfills the following National Science Standards:

- Content standard C: Students should develop an understanding of the molecular basis of heredity.

#### STEM Connection:

This activity will help students learn more about the following careers: Forensic science, lab technician, and a molecular biologist.

#### Goals(s):

The goal of this lesson is to:

- understand the process of DNA Fingerprinting.
- know how DNA Fingerprinting is used in solving crimes.

#### Learning Objective(s):

Upon completion of this lesson, students will be able to (Include process skills but be specific. What will the STUDENTS be able to do/demonstrate as a result of this lesson?):

- analyze electrophoresis results from DNA Fingerprinting.
- List three applications for DNA Fingerprinting.

### **Purpose/Rationale:**

DNA Fingerprinting is a very useful tool in solving crimes. Many classrooms do not have the equipment to do a restriction digest and run electrophoresis. This activity will allow the students a chance to simulate the process analyzing the results of DNA Fingerprinting.

### **Materials/Resources:**

In order to complete this lesson, the following materials are needed:

- Enough computers for the students to work individually or in groups.
- Access to the internet.
- Student worksheet

### **Prior Teacher Preparation:**

The teacher should understand the process of DNA Fingerprinting. The following website has a useful article: [www.extension.iastate.edu/Publications/NCR550:pdf](http://www.extension.iastate.edu/Publications/NCR550:pdf)

### **3-Step Procedure:**

#### **#1 Introduction:**

- Review DNA structure.
- Find out what students ideas are on DNA Fingerprinting. What have they heard?
- Explain the process of doing a restriction digest, the use of restriction enzymes and how electrophoresis works.
- Use teaching charts, video clips, books, presentation software, instructional software, articles, tapes, overhead projector, handouts, models, etc. to accent instruction.
- This activity can be done individually or in groups, depending on the number of computers available.

#### **#2 Explorations:**

- Students will first read the crime scenario.
- They will then visit the website: [www.biotech.iastate.edu/biotech\\_info\\_series/bio6.html](http://www.biotech.iastate.edu/biotech_info_series/bio6.html) and answer some questions on the background of DNA Fingerprinting.
- Following the background questions, students will analyze electrophoresis results from three suspects for the crime.
- Using the electrophoresis analysis, students will determine who committed the crime by comparing the crime scene DNA Fingerprinting results to their analysis of the three suspects.

- There is a student worksheet that accompanies this page of teacher information.

### **#3 Application:**

- This activity should interest the students because of DNA Fingerprinting activities used in crime dramas like CSI. They should also have a better understanding of the process when they hear about it being used to solve real crime cases.
- This activity can be used as a precursor to a real electrophoresis lab if the proper equipment is available. EDVOTEK offers an easy to use DNA Fingerprinting kit.
- This activity will give students an idea of the type of work done in crime labs as well as in genetics labs. They will get a feel for careers in criminal science, especially the career of laboratory technician.

### **Assessment:**

- The students will be evaluated based on their analysis of the three suspect electrophoresis results, as well as their ability to correctly determine which suspect committed the crime.