Who Ate the Cheese?

**Introduction:**

In this simulation you will examine crime scene evidence to determine who is responsible for eating the Queen's special imported Lindbergher Cheese (yes, the stinky cheese). You will model the process of electrophoresis and DNA fingerprinting.

**Investigator Background Knowledge:**

The cheese was allegedly stolen from the Queen's sitting room the night before the grand ball. The wheel of cheese was on a platform in the sitting room, and half of it had been eaten. The cheese was listed as a gift from the Manchurian diplomat and valued at $12,000. Officer Li Gase dusted for fingerprints and found none on the table or doors; the maid claimed that they had been wiped clean earlier. We took pictures of the half eaten cheese and sent it to the lab for further tests. Edna N. Zime, the lab technician said that saliva samples could be taken from the teeth imprints on the cheese that was left behind.

**Suspect Number: 1**

Name: Princess Dubbah Elix

Description of Suspect: The princess was seen entering the sitting room earlier in the evening. She is well known for her love of cheese.

**Suspect Number 2**

Name: Electra Foresis

Description of Suspect: Electra was recently involved in a relationship with the Manchurian diplomat that sources say ended badly. Her motive may have been to sabotage the diplomat's gift to the Queen.

**Suspect Number 3**

Name: Ada Nine

Description of Suspect: Ada was the maid in charge of cleaning the sitting room. She had access to the cheese.

**Suspect Number 4**

Name: Gene Tics

Description of Suspect: Gene is the leader of the local Cheese-Makers Guild, he may not have wished for Queen Elizabeth to have cheese from anywhere but his own guild.

**Vocabulary:**

**Electrophoresis**: Method using an electrical field which leads to the separation of proteins or DNA fragments based on their size. Smaller proteins or DNA fragments move faster; larger ones slower. Samples are normally placed in the electrical field loaded in a gel-like substance, called agar or agarose.

**Restriction Enzyme**: enzyme that cuts DNA molecules at specific nucleotide sequences.

DNA Fingerprint: unique sequence of DNA base pairs that can be used to identify a person at the molecular level

**Polymerase Chain Reaction (PCR):** method for increasing the quantity of DNA by separating it into 2 strands and adding primers and enzymes.

**Materials**

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| ✓ | **Materials** |
|  | Handout |
|  | DNA patterns |
|  | Tape |
|  | Scissors |

**Procedure**

1. Turn your paper strips (DNA sequences) so that the side with the bases is facing you. The restriction enzyme cuts at every point it finds **C C G G**, always cutting between the C and the G. Label the back of the slips with the suspect number so that you don't get them confused after cutting. Use scissors to cut the DNA sequence at the C C G G points.
2. Count the number of base pairs (bp) in each piece of DNA that you created. Record the base pair number on the back side of the DNA fragment.
3. Draw a black box on the chart where your DNA fragments would be, using the base pair numbers as a guideline for fragment placement.
4. Compare the crime scene DNA to the suspects and indicate on your chart, which suspect is guilty of eating the cheese.
5. On your chart, label the positive (+) and the negative (-) ends. Circle the suspect's DNA who matches the DNA at the crime scene and write the name of the suspect.

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| **Crime Scene DNA** | **Suspect 1** | **Suspect 2** | **Suspect 3** | **Suspect 4** | **# of base pairs (bp)** |
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**Results**

1. For each of the following tasks performed in the activity, describe what you are actually simulating.

**Cutting the DNA into fragments:**

**Drawing the DNA onto the paper**:

1. For each word below, describe how it relates to DNA Fingerprinting:

**Polymerase Chain Reaction**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Gel Electrophoresis**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Restriction Enzyme**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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