CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
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Project Number
J0412

Project Title
Who Done It? DNA Fingerprinting and Forensics

Abstract

Objectives/Goals
Can DNA fingerprinting with the help of restriction enzymes help solve a crime scene mystery? If there are several suspects, how can the different DNAs be matched to that of the crime scene DNA? Also, can increasing the voltage in the electrophoresis chamber cause the DNA fragments to move faster and further on the agarose gel?

Methods/Materials
Rehydrate DNA/buffer samples with 200 ul sterile water. Rehydrate EcoRI/PstI enzyme mix with 750 sterile water. Prepare electrophoresis buffer by adding 60ml of 50X concentrate to 2.94 liters of distilled water. Prepare 1% agarose gel by adding 1 gram of agarose powder to 100 ml of buffer. Pour agarose gels enough to cover the gel com teeth (0.5-0.75cm). On day 1 prepare DNA samples by adding 10ul of DNA to 10ul of enzyme mix. Incubate tubes overnight at 37C. On day 2 add 5 ul loading dye to DNA samples. Place agarose gel in chamber with 275 ml of buffer. Inject 10ul of DNA size marker (standard) into lane one well. Inject 20 ul of Crime Scene DNA into lane 2. Do same as CS for suspects. Electrophorese for 40 minutes. Place gel into staining tray, add 60 ml of DNA stain and let stay overnight covered at room temperature. Day 3; Pour off DNA stain and add 60 ml water and destain for 15 minutes. Pour off water and analyze.

Conclusions/Discussion
Suspect 3 had the same DNA fragments as the Crime Scene DNA pattern for every trial. It was easier to figure this out by looking at the gels, than by comparing the base pair sizes on graphs which slightly overlapped with the other suspects. Some of the lighter base pairs traveled further than the last band of the marker, but I was still able to match the suspect to the crime scene. I did contaminate all of the DNA samples with suspect 3 DNA for trials 2-6, but that did not make a difference since the number of bands and distance is close to trial 1. Trial 2 at 200V gave the best results and band separation with identical distances traveled by CS and S3. Trial 2 worked best probably because all of the samples and reagents were fresh on first day.
Increasing the voltage (IV) made the bands travel further (DV), but did not change the patterns, so the same suspect could be matched to the CS.

Summary Statement
Restriction enzymes cut DNA of crime suspects into smaller fragments, which by electrophoresis can be matched to DNA found at a crime scene.

Help Received
My aunt let me test my experiment at her clinical lab. My mom helped me understand the biotechnology of DNA fingerprinting. My dad helped me with my graphs and excel.