

Name _____ Pd _____ Date _____

DNA Electrophoresis Virtual Lab

Teacher's Notes

Go to the following link, <http://www.pbs.org/wgbh/nova/education/body/create-dna-fingerprint.html>, complete the virtual lab and answer the questions. Read the introductory paragraph and answer the pre-lab questions before running the virtual lab.

Pre-Lab Questions

1. Why is DNA valuable as forensic evidence?
A portion of each person's DNA is unique to them.
2. Is it possible for two people to have the same DNA? Explain.
Yes, if you have an identical twin.
3. What is the first thing you'll be doing in this lab?
Create a DNA profile
4. What is the objective of the lab?
Find out which one of 7 suspects committed the crime.

Lab Questions

5. What is the source of DNA evidence left at the crime scene?
Saliva
6. What is the purpose of the restriction enzymes?
They act as scissors and cut the DNA at key points, resulting in DNA fragments of various lengths.
7. What is the purpose of the agarose gel?
It acts as a strainer and allows the shorter DNA fragments to pass through faster than the longer ones.
8. Where do you pour the fragmented DNA?
Into a hole in the agarose gel.
9. Explain how electrophoresis works:
 - a. Why is an electrical charge run through the gel?
To make the DNA molecules move.
 - b. Why does the DNA move toward the positive end of the tray?
DNA molecules have a slight negative charge and opposite charges attract.
 - c. How are the various lengths of DNA fragments distributed throughout the gel tray?
The fragments will be distributed from shortest to longest as you go from the positive end to the negative end of the tray.

10. What is the purpose of the nylon membrane?

To soak up the DNA from the agarose gel. The membrane is easier to handle and work with than the agarose gel.

11. Why are probes poured onto the nylon membrane?

The probes are radioactive DNA segments. Each one is designed to attach to the DNA fragments at a specific location (aka code). Excess probes that don't attach to the DNA fragments are washed away.

12. Why is the x-ray film placed on top of the nylon membrane?

The x-ray film is exposed where the probes are attached to the DNA fragments.

13. What happens after the x-ray film is run through the developer?

The developer creates a "picture" of the locations of the probes. This is the DNA fingerprint of the original DNA fingerprint.

14. What do the marks represent?

They represent the regions of the DNA fragments where the probes are attached.

15. Compare and contrast DNA profiles to fingerprints.

DNA profiles and fingerprints are similar in that they are unique to each individual, they can be obtained from evidence left at crime scenes, and the profiles and prints are visual representations of the evidence left at the crime scene. They are different in that fingerprints come from the ridges of a person's fingers leaving oils on a surface that is touched, whereas DNA is genetic code material inside biological cells that the suspect leaves behind. The quality of DNA samples is much higher than that of fingerprints, because fingerprints can be smudged or partial prints, whereas DNA evidence is usually of sufficient quality and quantity to create a profile. DNA comes from several sources on a person's body, but fingerprints only come from a person's fingers. So it is easier for the suspect to make sure he or she leaves no fingerprints behind than it is for them to make sure they didn't leave any DNA samples behind.

Conclusion

16. Which suspect committed the crime?

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