**DNA DETECTIVE WORK**

Unless you have a twin, no one in the world has a DNA sequence identical to yours. Although 99 percent of the DNA is the same in all humans, certain segments vary widely. Differences in these segments are detected through DNA fingerprinting. A small amount of tissue, such as blood, hair, or semen, is all that is needed to create a DNA fingerprint. The sample is cut up using enzymes and the segments are separated by size through gel electrophoresis. DNA is made visible either with radioactive probes or by staining. This reveals a pattern of bars: the DNA fingerprint. If the two DNA fingerprints match, they probably came from the same person. If they don't match, they certainly came from different individuals. In recent years, a number of people convicted of crimes have been exonerated based on DNA evidence.

**Activity**

In this exercise, you will learn the basics of DNA fingerprinting and consider the use of DNA in criminal investigations.

**Part 1.**

Use your browser to go to NOVA’s web site about “Killers Trail,” the story behind the man who inspired the Fugitive TV series and later the movie version starring Harrison Ford:

<http://www.pbs.org/wgbh/nova/sheppard/>

Click on the “Chronology of a Murder” section and read about the events that led up to the murder trial of Dr. Sam Sheppard.

1. In your opinion, what role (if any) did newspaper stories and editorials have in the outcome of the original trial of Dr. Sam Sheppard?

Go back to the Killers Trail homepage and select ”Create a DNA Fingerprint.”

Read about the crime and the suspects then go on to part 2. Answer the following questions about the technique as you go through the simulation:

1. What is the function of the restriction enzymes in DNA fingerprinting?
2. What is the function of the agarose gel electrophoresis step?
3. Why is a nylon membrane used to blot the DNA?
4. What does a dark spot on the X-ray film indicate?

**Part 2.**

Use your browser to go to Frontline's "What Jennifer Saw" at

<http://www.pbs.org/wgbh/pages/frontline/shows/dna/>.

The material on this site is about a man convicted of rape but later exonerated by DNA evidence. To read a summary of the case, choose the link to Ronald Cotton's wrongful conviction, then choose "Summary of Cotton's Case."

In the interviews section, read the interviews with DNA expert Peter Neufeld and lawyer Barry Scheck.

Answer the following questions:

1. What evidence was initially used to convict Cotton?
2. What did the DNA evidence show?
3. How could DNA fingerprinting be used to prevent a false conviction if a case like this was being tried today?
4. What percentage of convicts are unjustly convicted of sexual assault cases, according to Neufeld and Scheck?
5. The O.J. Simpson trial was one of the most visible trials that attempted to use DNA evidence. In the end, the DNA evidence was not satisfying to the jury, who acquitted Simpson. What do Neufeld and Scheck believe about the impact of the O.J. Simpson trial on the use of DNA evidence?