

Name(s) _____ Class _____ Date _____

Pre-Lab Focus Questions: Introduction to DNA Fingerprinting

1. Compare the “backbone” of sugar-phosphate arrangement in the side chains of all three figures. Are there any differences?
2. In the above figure, do all three samples contain the same bases? Describe your observations.
3. Are the bases paired in an identical manner in all three samples? Describe the pattern of the base pair bonding.
4. In your attempt to analyze DNA samples from three different individuals, what conclusions can you make about the similarities and differences of the DNA samples?
5. What will you need to compare between these DNA samples to determine if they are identical or non-identical?

Lesson 1 Restriction Digests of DNA Samples

1. How many **pieces** of DNA would result from this cut?
2. Write the **base sequence** of the DNA fragments on both the left and right side of the “cut”.

Left: _____ Right: _____
3. What differences are there in the two pieces?
4. DNA fragment **size** can be expressed as the number of **base pairs** in the fragment. Indicate the size of the fragments [mention any discrepancy you may detect].
 - a. The smaller fragment is _____ base pairs (bp).
 - b. What is the length of the longer fragment?

5. Consider the two samples of DNA shown below [single strands are shown for simplicity]:

Sample #1:

Sample #2:

If both samples are treated with a restriction enzyme [recognition sequence **GAATTC**] then indicate the number of fragments and the size of each fragment from each DNA sample of DNA.

Sample #1

Sample #2

of fragments: _____

of fragments: _____

List the fragment size in ascending order: largest → smallest

Sample #1

Sample #2

Lesson 1 Restriction Digestion of DNA Samples

Observation Questions

1. Describe the samples of DNA (physical properties).
2. Is there any observable difference between the samples of DNA?
3. Describe the appearance of the restriction endonuclease mix.

Lesson 1 Restriction Digestion of DNA Samples

Review Questions

1. Before you incubated your samples, describe any visible signs of change in the contents of the tubes containing the DNA combined with the restriction enzymes.

2. Can you see any evidence to indicate that your samples of DNA were fragmented or altered in any way by the addition of *EcoRI/PstI*? Explain.
3. In the absence of visible evidence of change, is it still possible that the DNA samples were fragmented? Explain your reasoning.
4. (*answer the next day-after the restriction digest*)
After a 24 hour incubation period, are there any visible clues that the restriction enzymes may have in some way changed the DNA in any of the tubes? Explain your reasoning.

Lesson 2 Agarose Gel Electrophoresis

Review Questions

1. The electrophoresis apparatus creates an electrical field [positive and negative ends of the gel]. DNA molecules are negatively charged. To which pole of the electrophoresis field would you expect DNA to migrate (+ or -)? Explain.
2. What color represents the negative pole?
3. After DNA samples are loaded in wells, they are “forced” to move through the gel matrix. Which size fragment (large vs. small) would you expect to move toward the opposite end of the gel most quickly? Explain.
4. Which fragments are expected to travel the shortest distance [remain closest to the well]? Explain.

Post-Lab Thought Questions

1. What can you assume is contained within each band?

2. If this were a fingerprinting gel, then how many kinds (samples) of DNA can you assume were **placed in each separate** well?
3. What would be a logical explanation as to why there is more than one band of DNA for each of the samples?
4. What probably caused the DNA to become fragmented?
5. Which of the DNA samples have the same number of restriction sites for the restriction endonuclease used? Write the lane numbers
6. Which sample has the smallest DNA fragment?
7. Assuming a circular piece of DNA (plasmid) was used as starting material, how many restriction sites were there in lane three? Please note that the starting material was a circular piece of DNA.
8. From the gel drawing on page 35, which DNA samples appear to have been “cut” into the same number and size of fragments?
9. Based on your analysis of the example gel drawing on page 35, what is your conclusion about the DNA samples in the photograph? Do any of the samples seem to be from the same source? If so which ones? Describe the evidence that supports your conclusion.

Post-lab: Analysis of Results

Make a drawing of the banding patterns from the DNA electrophoresis below.

