

DNA Technology Chapter 20

1. Describe the use of a restriction enzyme to create a recombinant DNA plasmid.
2. Identify some potential difficulties in using plasmid vectors and bacterial host cells to produce proteins from cloned eukaryotic genes.
3. Outline a procedure for cloning a gene using a bacterial plasmid.
4. Describe a method you could use to identify which bacteria in a culture had been transformed by a plasmid you provided.
5. a) During DNA replication, DNA polymerase is unable to replace the RNA primers at the end of a fragment, resulting in shortening of the DNA with each replication. Why is this not a problem during PCR?
b) Identify a practical limitation of PCR.
6. In a DNA microarray, cDNA from normal tissue is labeled with a green fluorescent molecule while cDNA from cancerous tissue is labeled with a red fluorescent molecule. What color spots would represent genes you would be interested in if you were studying cancer?
7. Explain how gel electrophoresis can be used to separate and visualize DNA fragments.
8. Describe the technique of Southern blotting and give an example of when it might be useful.
9. Imagine you have isolated a gene that seems to be involved in multiple sclerosis. Describe how you would determine the sequence of the gene.
10. Why is cDNA rather than genomic DNA used when cloning a gene?
11. a) How can we identify protein-coding sequences in DNA?
b) How can we determine the function of a gene?
c) Why is this information useful?
12. Imagine you want to know which genes are expressed in a particular embryonic tissue compared to the same tissue in the fetus and the adult. How would you do this?
You hope to study a gene that codes for a neurotransmitter protein produced in human brain cells. You know the amino acid sequence of the protein. Explain how you might
 - a) identify if the gene is expressed in a specific type of brain cell;
 - b) identify and isolate the neurotransmitter gene,
 - c) produce many copies of the gene,
 - d) produce a large quantity of the neurotransmitter protein for evaluation as a potential medication.
13. How might DNA technology be used
 - a) to identify the carrier of a disease-causing allele?
 - b) in forensic applications?
 - c) in the genetic modification of organisms?
 - d) for gene therapy?
14. Briefly outline some ethical and environmental concerns surrounding the use of DNA technology.