

Chapter 14

Advanced Biotechnology Techniques

1) Explain several the benefits of knowing the DNA sequences of humans and other organisms. What are some future potential applications of this new genomic data?

2) How was DNA sequenced using the Sanger Method? Describe the recent improvements that have increased the efficiency of this process.

3) **Complete the following paragraph:**

The ***Western Blot Technique*** is very similar to the _____, except that the protein-containing or suspected protein-containing samples are run on a _____. If there are several proteins in a sample, they move down a lane based on their _____. Since they are colorless, they must be visualized. If the gel is stained, all the proteins are visible. By transferring the bands to a membrane, the membrane can be probed with an antibody that will recognize only the one _____ in a mixture. In the Western blot, like an ELISA, the membrane must be colorized. The antibody has an enzyme-reporter molecule, like _____, on it. When the substrate for HRP (TMB) is added, the HRP oxidizes the TMB, changing it from clear to blue. A blue band results where the antibody is attached. In both ELISAs and Western blots, _____, but care must be taken to ensure that the dilutions of the samples are made correctly. If not, smudges may result with no sample recognition.

4) Proteomics is the study of how, when, and where proteins are used in cells. Tools of proteomics include protein crystallography and x-ray diffraction, mass spectrometry, NMR, and several assays, including ELISAs, Western blots, and protein arrays. ***Provide a description of the following lab practices. Be certain to explain the reagents needed to perform the technique as well as the expected results.***

a. Northern Blot -

b. Southern Blot -

c. Western Blot -

d. ELISA -

5) Outline important applications of the growing biotechnology fields of pharmacogenetics, environmental and marine biotechnology, and bioterrorism/biodefense.