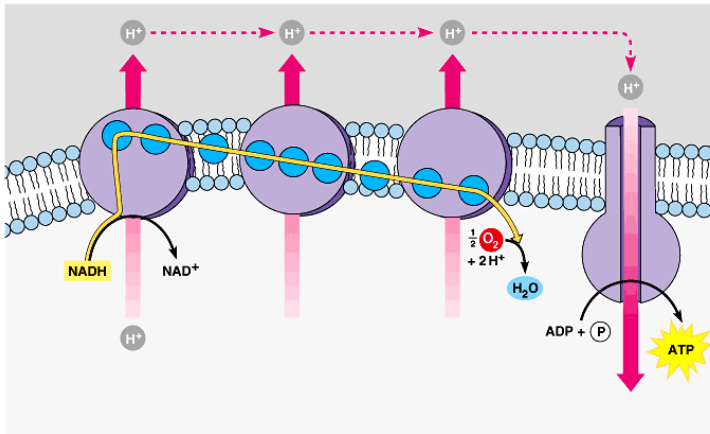


1. A cell biologist found that two different proteins with largely different structures were translated from two different mRNAs. These mRNAs, however, were transcribed from the same gene in the nucleus. What mechanism could best account for this? (10%)

2. Summarize how the electron transport works in mitochondria as the following picture shown. (20%)



3. Describe the differences between parasympathetic division and sympathetic division. (10%)

4. Why is sexual reproduction important to the process of natural selection during evolution? (10%)

5. Which of the following are biopolymers? (10%)

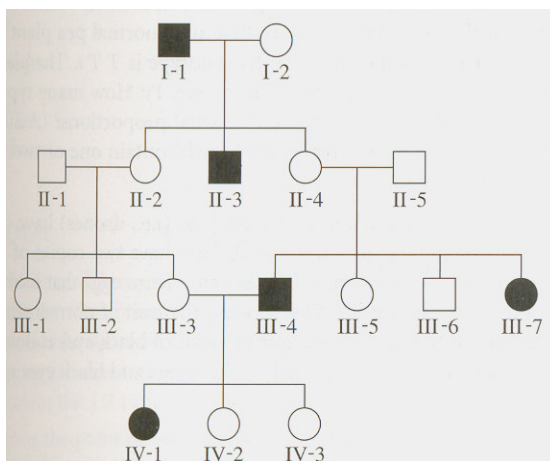
- 甲、 Amino acids
- 乙、 Urea
- 丙、 Water
- 丁、 Proteins
- 戊、 O₂
- 己、 DNA
- 庚、 Hemoglobin
- 辛、 Cellulose
- 壬、 Nucleotides

6. For each cell organelle listed below, tell whether it is present in plant cells, animal cells, or both. (15%)

- 甲、 Nucleus
- 乙、 Glyoxysomes
- 丙、 Mitochondria
- 丁、 Lysosomes
- 戊、 Peroxisomes
- 己、 Chloroplasts
- 庚、 Ribosomes

7. A zoologist examined an intestine cell from a crayfish and counted 200 chromosomes, each consisting of 2 chromatids, at prophase I of mitosis. What would he expect to see in each of the four cells at telophase II of meiosis if he looked in the crayfish ovary? (10%)

8. For the following pedigree, describe what you think is the most likely inheritance pattern (dominant or recessive). Explain your reasoning. Filled (black) symbols indicate affected individuals.



Is the defected gene in the pedigree dominant or recessive?

If $f(\text{dominant})=0.6$ and $f(\text{recessive})=0.4$, calculate the probability of affected individual II-3 would occur. (15%)