

## MT ESSAYS TO REVIEW:

### Short Answer Topics:

- ✓ Blood typing genetics
- ✓ Solubility and the properties of water
- ✓ Transcription, translation and replication
- ✓ Levels of protein structure
- ✓ Prokaryotes and eukaryotes, similarities and differences.
- ✓ Cell organelles. Structure and function. Especially the cell membrane.
- ✓ Hardy Weinberg problems
- ✓ Genetic engineering. How would you get the genetic code ( DNA) for a protein based on the amino acids which make it up.
- ✓ Making a restriction map of a plasmid chromosome.

Normal essays: I will pick from these. The standards are at

<http://apbio.biosci.uga.edu/exam/Essays/html/index.html>

And <http://apbio.biosci.uga.edu/exam/Essays/html/index.html>

### 1994:

Enzymes are biological catalysts

- a. Relate the chemical structure of an enzyme to its specificity and catalytic activity.
- b. Design a quantitative experiment to investigate the influence of pH or temperature on the activity of an enzyme.
- c. Describe what information concerning the structure of an enzyme could be inferred from your experiment.

### 1969:

Suppose a team of scientists is examining the cells of a newly discovered species. They observe under the light microscope an organelle that appears to be different from any that has been described before. Assume that you are director of the research team.

Describe the methods that you would have the team use to determine whether the structure is a mitochondrion, ribosome, lysosome, nucleolus, or indeed a new organelle.

Discuss the advantages and limitations of each method in revealing the role of the unknown organelle in the living cell.

### 1990

Describe the steps of protein synthesis, **beginning with** the attachments of a messenger RNA molecule to the small subunit of a ribosome and **ending with** the release of the polypeptide from the ribosome. Include in your answer a discussion of how the different types of RNA function in this process.

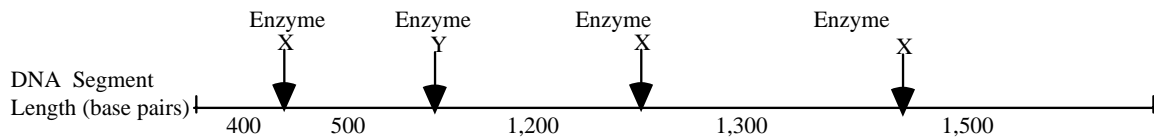
**1995**

Energy transfer occurs in all cellular activities. For 3 of the following 5 processes involving energy transfer, explain how each functions in the cell and give an example. Explain how ATP is involved in each example you choose.

- Cellular movement
- Active transport
- Synthesis of molecules
- Chemiosmosis
- Fermentation

**1995**

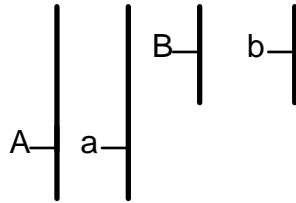
The diagram below shows a segment of DNA with a total length of 4,900 base pairs. The arrows indicate reaction sites for restriction enzymes (enzyme X and enzyme Y).



- (A) Explain how the principles of gel electrophoresis allow for the separation of DNA fragments.
- (B) Describe the results you would expect from the electrophoretic separation of fragments from the following treatments of the DNA segment above. Assume that the digestions occurred under appropriate conditions and went to completion.
- I. DNA digested with only enzyme X
  - II. DNA digested with only enzyme Y
  - III. DNA digested with enzyme X and enzyme Y combined
  - IV. Undigested DNA
- (C) Explain both of the following.
- (1) The mechanism of action of restriction enzymes.
  - (2) The different results you would expect if a mutation occurred at the recognition site for enzyme Y.

**1996**

An organism is heterozygous at two genetic loci on different chromosomes.



- Explain how these alleles are transmitted by the process of mitosis to daughter cells.
- Explain how these alleles are distributed by the process of meiosis to gametes.
- Explain how the behavior of these two pairs of homologous chromosomes during meiosis provides the physical basis for Mendel's two laws of inheritance.

Labeled diagrams that are explained in your answer may be useful.

**1989**

Explain what occurs during the Krebs (citric acid) cycle and electron transport by describing the following:

- The location of the Krebs cycle and electron transport chain in the mitochondria.
- The cyclic nature of the reactions in the Krebs cycle.
- The production of ATP and reduced coenzymes during the cycle.
- The chemiosmotic production of ATP during electron transport.

**1971:**

The process of photosynthesis consists of two phases, the light reactions and the dark reactions.

Discuss each of these groups of reactions and their interrelationships.

**1994:**

Genetic variation is the raw material for evolution.

- Explain three cellular and/or molecular mechanisms that introduce variation into the gene pool of a plant or animal population

**1992:**

Evolution is one of the unifying concepts of modern biology. Explain the mechanisms that lead to evolutionary change. Describe how scientists use each of the following as evidence for evolution:

- 1) Bacterial resistance to antibiotics
- 2) Comparative biochemistry
- 3) The fossil record

b. Explain the evolutionary mechanisms that can change the composition of the gene pool.