

BIOLOGY 205
Midterm I - 30 April 2010
(100 points total)

Name _____

Multiple choice questions – 3 points each (please circle the letter of single best answer).

1. Predict which of the following organisms will have the highest percentage of **unsaturated** phospholipids in their membranes.
 - A. thermophilic bacterium
 - B. polar bear
 - C. human
 - D. desert snake
 - E. Antarctic fish

2. The **glucose-sodium transporter** system is an example of:
 - A. Uniporter facilitating an antiporter
 - B. Symporter facilitating a uniporter
 - C. Uniporter passively driving an antiporter
 - D. Antiporter passively driving a symporter
 - E. Antiporter actively driving a symporter

3. When comparing the different levels of protein structure, which is/are best described by the occurrence of two cysteine residues forming a covalently linked **disulfide bridge**?
 - A. primary
 - B. secondary
 - C. tertiary
 - D. quaternary
 - E. all of the above

4. Of the following, which organelle and/or structure is NOT part of the **endomembrane system**?
 - A. nuclear envelope
 - B. endoplasmic reticulum
 - C. mitochondria
 - D. golgi apparatus
 - E. lysosome

5. In a generalized eucaryotic cells, which of the following organelles is **analogous** to the function of a mammalian stomach?
 - A. chloroplast
 - B. lysosome
 - C. nucleus
 - D. ribosome
 - E. storage or food vacuole

6. Signal recognition particles help cause the endoplasmic reticulum to become rough with ribosomes. In addition to this, what kind of “**tag**” is transferred to an asparagine in the new polypeptide to help send it to its final location?
- A. oligosaccharides
 - B. nucleic acids
 - C. lipids
 - D. specialized amino acids
 - E. GTP
7. The Hershey-Chase blender experiment, in which T2 bacteriophage were grown in the presence of radioactive precursors, showing which of the following?
- A. DNA, and not protein, is the hereditary material in this virus.
 - B. Protein, and not DNA, is not the hereditary material in this virus.
 - C. DNA, and not protein, is the hereditary material in this bacterium.
 - D. Protein, and not DNA, is not the hereditary material in this bacterium.
 - E. Just because bacteriophage are viruses doesn't mean they have hereditary material.
8. When considering biological **membranes**, which of the following characteristics would NOT be applicable?
- A. The fluid mosaic model
 - B. All contain proteins, however their distribution is asymmetric
 - C. Transmembrane proteins are amphipathic
 - D. There are generally more carbohydrates attached on the outer surface
 - E. Fluidity is controlled by protein structure
9. The **nucleoli** (nucleolus if only one), aside from being a sub-component of the cell's nucleus, are best characterized by which of the following properties?
- A. histone generation
 - B. chromosome condensation
 - C. membrane production
 - D. ribosome assembly
 - E. necessary for S phase
10. A paramecium has **special needs** when it comes to living in an aquatic environment, which of the following best describes how it deals with this problem?
- A. Uses a contractile vacuole to pump water into the cell as water tends to cause lysis.
 - B. Uses a contractile vacuole to pump water out of the cell as water tends to cause lysis.
 - C. Uses a contractile vacuole to pump water into the cell as water tends to cause shriveling.
 - D. Uses a contractile vacuole to pump water out of the cell as water tends to cause shriveling.
 - E. Has decided that osmosis sucks and evolved to use a cell wall instead.

Matching – 2 points each. Use single best answer to match the organelle or cell type with the characteristic and/or process that is best described or associated with it. The choices may be used once, more than once, or not at all. The choices are: **A.** Ribosome, **B.** Mitochondria, **C.** Chloroplast, **D.** Peroxisome, and **E.** Bacteria.

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|-----|-------|-------------------------------------------------|-----|-------|--------------------|
| 11. | _____ | Mesosome | 16. | _____ | Amyloplast |
| 12. | _____ | Oxygen source | 17. | _____ | Granum |
| 13. | _____ | Protein synthesis site | 18. | _____ | Stroma |
| 14. | _____ | Deals with excess H ₂ O ₂ | 19. | _____ | Cristae |
| 15. | _____ | Matrix | 20. | _____ | Made mostly of RNA |

Matching – 2 points each. Consider the bonds formed by condensation reactions for the major biological polymers and/or macromolecules. Match the single best answer with the statements below. The choices may be used once, more than once, or not at all. The choices are: **A.** Nucleic acids, **B.** Polysaccharides, **C.** Lipids, **D.** Proteins, **E.** Produced, and **F.** Consumed.

- | | | |
|-----|-------|---------------------------------------------------------------|
| 21. | _____ | Phosphodiester linkage |
| 22. | _____ | Glycosidic linkage |
| 23. | _____ | Ester linkage |
| 24. | _____ | Polypeptide linkage |
| 25. | _____ | Water gets ????? during the formation of each of these bonds? |

True or False – (2 points each)

- | | | |
|-----|-------|-------------------------------------------------------------------------------------------------------------------|
| 26. | _____ | Nucleosomes are made of both histones and DNA. |
| 27. | _____ | ATP is the universal energy carrier inside the cell, getting formed in both the mitochondria and the chloroplast. |
| 28. | _____ | The most abundant polymer on Earth is cellulose formed by a β 1-4 glycosidic linkages. |
| 29. | _____ | Actin filaments are required for the development of a cleavage furrow in animal cells. |
| 30. | _____ | The nuclear lamina is a network of intermediate filaments just inside the nuclear envelope. |

Short answer – Number of points in parentheses.

31. (6 points) What are three specific mechanisms (AND when these occur) for introducing genetic variation from one generation to the next in sexually reproducing organisms?

Process

Stage in cell cycle when this occurs (be specific)

32. (6 points) What is the *ploidy* level and how many *sister chromatids* are there in your own cells during (hint - you normally have 23 pairs of chromosomes):

| | <u><i>ploidy</i></u> | <u><i># of sister chromatids</i></u> |
|----------------------------------------------------------|----------------------|--------------------------------------|
| Anaphase I? | _____ | _____ |
| Anaphase II? | _____ | _____ |
| Just after telophase II? (i.e., includes cytokinesis) | _____ | _____ |

33. (4 points) Consider secretory vesicles containing insulin. Where do these originate inside a pancreas cell AND what type of trans-membrane process does this specifically represent?

- 34. (4 points)** Consider the major types macromolecules that are required to build a cell. (A) Of these, which one is NOT technically a polymer? (B) What type of interactions are necessary to cause these macromolecules to stick together?
- 35. (4 points)** Programmed cell destruction or apoptosis makes use of what organelle? Briefly, how might this process work, in other words what steps would be involved?
- 36. (6 points):** Consider the “idealized” cell. Starting on the outside of a plant cell and moving to inside the thylakoid space of a chloroplast, what are the minimum number of membranes you would have to cross AND what are each of their names?

37. **Extra Credit (6 points max):** Name the **cytoskeleton** component most responsible for the following characteristics **AND** state a good reason as to how or why it is involved with this scenario:
- A. (2 points) causes movement of organelles from various locations inside the cell –

 - B. (2 points) responsible for cytoplasmic streaming inside a plant cell –

 - C. (2 points) chromatophore contraction causing color change in fish scale cell –