MULTIPLE CHOICE.—For the following multiple choice questions circle the letter in front of the response that best answers the question or completes the sentence. (20 points, 2 points each)

1. Which of the following phyla has members that possess an anus?
   a. Platyhelminthes
   b. Porifera
   c. Cnidaria
   d. Rotifera
   e. None of the above (all lack anuses)

2. Which of the following is NOT true about Fungi?
   a. They secrete enzymes to digest food.
   b. They often have life cycles with a dikaryotic stage.
   c. They have cell walls with cellulose.
   d. They are composed of hyphae.
   e. None of the above (all are true)

3. Which of the following have radial symmetry as adults?
   a. Platyhelminthes
   b. Rotifera
   c. Echinodermata
   d. the lophophorates
   e. None of the above (all are bilateral)

4. Which of the following is ABSENT in members of the Subphylum Urochordata?
   a. somites
   b. notochord
   c. enterocoelom
   d. dorsal nerve cord
   e. None of the above (all are present in urochordates)

5. What is the function of the amnion?
   a. dispose of waste
   b. gas exchange
   c. nutrition
   d. protect embryo
   e. None of the above

6. Which of the following is NOT characteristic of protostomes?
   a. determinate cleavage
   b. ventral nerve cord
   c. spiral cleavage
   d. schizocoelom
   e. None of the above (all are characteristics possessed by protostomes)

7. What is the correct order of development for an animal?
   a. gastrula → blastula → morula
   b. blastula → morula → gastrula
   c. morula → gastrula → blastula
   d. blastula → gastrula → morula
   e. morula → blastula → gastrula

8. Which of the following is true and provides evidence that Animals and Fungi are closely related?
   a. They both make sperm by meiosis.
   b. They both store food as glycogen.
   c. They both have absorptive nutrition.
   d. They both contain acetylcholine.
   e. None of the above (all are false)

9. Which of the following tissues surrounds an enterocoelom?
   a. ectoderm
   b. pachyderm
   c. endoderm
   d. mesoderm
   e. endoderm & mesoderm

10. Which of the following is NOT a characteristic of all arthropods?
    a. molting
    b. open circulatory system
    c. exoskeleton
    d. antennae
    e. None of the above (all are present in all arthropods)
**MATCHING.**—For the following exercise match the answers in the right column with the corresponding words in the left column. Each letter may be used more than once.(7 points, 1 pt. each)

1. mycorrhizae   ______  A. photosynthesis
2. lamprey       ______  B. predation
3. tapeworm      ______  C. mutualism
4. lichen        ______  D. suspension feeding
5. sponge        ______  E. parasitism

**FILL-IN-THE-BLANK.**—For the following exercises write the appropriate word or words in the available space.(23 points)

1. Fill in the appropriate labels for the following drawing. (4 points)

   a. __________________________
   b. __________________________

2. Fill in the limbs below. (6 points)

<table>
<thead>
<tr>
<th>SPIDER</th>
<th>INSECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seg. 1</td>
<td></td>
</tr>
<tr>
<td>Seg. 2</td>
<td></td>
</tr>
<tr>
<td>Seg. 3</td>
<td></td>
</tr>
</tbody>
</table>

3. The class that includes the ray-finned fishes is __________________________.
   (3 points)

4. Label synapomorphies for the indicated branches below. (6 points)

   a. __________________________
   b. __________________________
   c. __________________________

5. Label synapomorphies for the indicated branches below. (4 points)

   a. __________________________
   b. __________________________
DEFINITIONS.—For the following words or phrases define them as accurately and concisely as possible. (20 points, 4 points each)

1. Torsion (Hint: the biological term not the term from physics):

2. Mycelium:

3. Viviparous:

4. Triploblastic:

5. Meroblastic Cleavage:

SHORT ANSWER.—For the following answers, address each question in as concise and lucid a manner as possible. Do NOT exceed the space provided. (10 points)

1. Explain how a schizocoelom forms. (3 points)

2. How and from what did vertebrate jaws evolve? (3 points)

3. What evidence supports the placement of birds in class Reptilia? (4 points)
SHORT ESSAYS.—For the following essays, address each question in as concise and lucid a manner as possible. Do NOT exceed the space provided. (20 points)

1. Describe the life cycle of a mushroom. Include all life cycle stages, ploidies, and important structures. Also indicate all cellular processes that occur. (Feel free to use text and/or drawings for your answer.) (10 points)

2. Explain how a newly fertilized egg keeps other sperm from causing polyspermy? Be sure to mention all important structures and processes. (10 points)