1. What is true of all fungi? They are
   a. eukaryotic, heterotrophic plants.
   b. eukaryotic, parasitic plants.
   c. saprobic plants.
   d. eukaryotic heterotrophs with cell walls.
   e. saprobic heterotrophs.

2. The following are all characteristic of hyphate fungi (that is, fungi featuring hyphae) except
   a. they acquire their nutrients by absorption.
   b. their body plan is a netlike mass of filaments called a mycelium.
   c. their cell walls consist mainly of cellulose microfibrils.
   d. they may be saprobes, parasites, or mutualistic symbionts.
   e. the nuclei of the mycelia are typically haploid.

3. In fungi, karyogamy does not immediately follow plasmogamy, which
   a. means that sexual reproduction can occur in specialized structures.
   b. results in more genetic variation during sexual reproduction.
   c. allows fungi to reproduce asexually most of the time.
   d. creates dikaryotic cells.
   e. is strong support for the claim that fungi are not truly eukaryotic.

The questions below refer to the following phyla. Each term may be used once, more than once, or not at all.

A. Zygomycota
B. Ascomycota
C. Basidiomycota
D. Deuteromycota
E. Chytridiomycota

4. This phylum (which is not a true phylum) is characterized by the lack of an observed sexual phase in its members' life cycles.

5. You are given an organism to identify. It has a fruiting body that contains many "sacs" with eight haploid spores lined up in a row. What kind of a fungus is it most likely to be?
   a. zygomycete
   b. ascomycete
   c. deuteromycete
   d. chytridiomycete
   e. basidiomycete

6. Mushrooms with gills, typically available in supermarkets, have meiotically produced spores located in or on __________ and belong to the phylum __________.
   a. asci ... Basidiomycota
   b. hyphae ... Zygomycota
   c. basidia ... Basidiomycota
   d. asci ... Ascomycota
   e. hyphae ... Ascomycota

7. Which of the following are true of deuteromycetes?
   a. They are the second of five fungal phyla to have evolved.
   b. They represent the phylum in which all the fungal components of lichens are classified.
   c. They are fungi whose forms of sexual reproduction, if they exist, have not been characterized.
   d. They are the group that includes molds, yeasts, and lichens.
   e. They include the fungi considered imperfect because they lack hyphae.
8. The symbiotic associations called mycorrhizae are considered
   a. parasitic.
   b. mutualistic.
   c. commensal.
   d. harmful to the plant partner.
   e. the beginning stages of the formation of lichens.

9. Why do biologists who study lichens sometimes refer to the symbiotic relationship between fungus and alga as controlled parasitism?
   a. Together, the fungus and alga may parasitize and kill other living organisms, such as plants.
   b. Each contributes to the maintenance of the other.
   c. Fungal haustoria may kill algal cells, but at a pace slow enough not to destroy all the algae present.
   d. Algal cells die at a faster rate than fungal cells.
   e. Fungal cells reproduce slower than the algae, thus becoming enclosed and unable to grow.

10. Which of the following characteristics is not shared by both chytrids and other kinds of fungi?
    a. presence of hyphae
    b. flagellated zoospores
    c. absorptive mode of nutrition
    d. chitinous cell walls
    e. amino acid base sequences of some enzymes

11. Both animals and fungi are completely heterotrophic. What distinguishes animal heterotrophy from fungal heterotrophy is that only animals derive their nutrition
    a. from organic matter.
    b. by preying upon animals.
    c. by ingesting it.
    d. by consuming living, rather than dead, prey.
    e. by using enzymes to digest their food.

12. Assuming that all of the following events occur, what is the correct sequence in which the following processes occur during the development of an individual animal?
    1. gastrulation
    2. metamorphosis
    3. fertilization
    4. cleavage
    a. 4, 3, 2, 1
    b. 4, 3, 1, 2
    c. 3, 2, 4, 1
    d. 3, 4, 2, 1
    e. 3, 4, 1, 2

13. Which of the following statements concerning animal taxonomy is true?
    1. Animals are more closely related to plants than to fungi.
    2. All animal clades based on body plan have been found to be incorrect.
    3. Kingdom Animalia is monophyletic.
    4. Only animals reproduce by sexual means.
    5. Animals are thought to have evolved from flagellated protists similar to modern choanoflagellates.
    a. 5
    b. 1, 3
    c. 2, 4
    d. 3, 5
    e. 3, 4, 5
14. What should animals as diverse as corals and monkeys have in common?
   a. body cavity between body wall and digestive system
   b. number of embryonic tissue layers
   c. type of body symmetry
   d. presence of Hox genes
   e. degree of cephalization

15. If a multicellular animal lacks true tissues, then it should be classified among the
   a. eumetazoa.
   b. metazoa.
   c. protozoa.
   d. parazoa.
   e. hydrozoa.

16. Cephalization is generally associated with all of the following except
   a. bilateral symmetry.
   b. concentration of sensory structures at the anterior end.
   c. a brain.
   d. a longitudinal nerve cord.
   e. a sessile existence.

17. Which of the following is an incorrect association of an animal germ layer with the tissues or organs to
which it gives rise?
   a. ectoderm outer covering
   b. endoderm internal lining of digestive tract
   c. mesoderm nervous system
   d. mesoderm muscle
   e. endoderm internal linings of liver and lungs

18. You have before you an unknown organism, which you examine carefully. Which of the following
would convince you it is not an acoelomate?
   a. It responds to food by moving towards it.
   b. It is triploblastic.
   c. It has bilateral symmetry.
   d. It possesses sensory structures at the anterior end.
   e. It exudes a fluid when you make an incision through the body wall.
Figure 32.1 shows a chart of the animal kingdom set up as a modified phylogenetic tree. Use the diagram to answer the following questions.

19. One opening to the digestive tract is characteristic of which of the following groups?
   a. I only
   b. III only
   c. IV only
   d. V only
   e. I and V

20. Which of the following is descriptive of protostomes?
   a. spiral and indeterminate cleavage, coelom forms as split in solid mass of mesoderm
   b. spiral and determinate cleavage, blastopore becomes mouth, schizocoelous development
   c. spiral and determinate cleavage, enterocoelous development
   d. radial and determinate cleavage, enterocoelous development, blastopore becomes anus
   e. radial and determinate cleavage, blastopore becomes mouth, schizocoelous development

21. The cortical reaction functions directly in the
   a. formation of a fertilization membrane.
   b. production of a fast block to polyspermy.
   c. release of hydrolytic enzymes from the sperm cell.
   d. generation of a nervelike impulse by the egg cell.
   e. fusion of egg and sperm nuclei.

22. Arrange the following stages of fertilization and early development into a proper sequence.
   I. onset of new DNA synthesis
   II. cortical reaction
   III. first cell division
   IV. acrosomal reaction; plasma membrane depolarization
   V. fusion of egg and sperm nuclei complete
   a. III, V, I, IV, II
   b. V, I, IV, II, III
   c. I, III, II, IV, V
   d. V, III, I, II, IV
   e. IV, II, V, I, III
23. How does the animal pole differ from the vegetal pole of a zygote?
   a. The animal pole has a higher concentration of yolk.
   b. The blastomere originates in the animal pole.
   c. The posterior end of the embryo forms here.
   d. The animal pole gives rise to the hemisphere with yellow yolk.
   e. The polar bodies bud from this region.

24. You observe an embryo in which the initial cleavage divisions are radial and meroblastic,
extraembryonic membranes develop, and a primitive streak is formed. How would you identify this
organism, based on the information given?
   a. invertebrate
   b. fish or amphibian
   c. reptile or bird
   d. bird or mammal
   e. mammal

25. Which developmental sequence is correct?
   a. cleavage, blastula, gastrula, and morula
   b. cleavage, gastrula, morula, and blastula
   c. cleavage, morula, blastula, and gastrula
   d. gastrula, morula, blastula, and cleavage
   e. morula, cleavage, gastrula, and blastula

26. Which of the following is mismatched?
   a. mesoderm notochord
   b. endoderm lungs
   c. ectoderm liver
   d. mesoderm somites
   e. ectoderm eye

Use the following information to answer the questions below. In a study of the development of frog
embryos, several early gastrulas were stained with vital dyes. The location of the dyes after gastrulation
was noted. The results are shown in the following table.

<table>
<thead>
<tr>
<th>Tissue</th>
<th>Stain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain</td>
<td>red</td>
</tr>
<tr>
<td>Notochord</td>
<td>yellow</td>
</tr>
<tr>
<td>Liver</td>
<td>green</td>
</tr>
<tr>
<td>Lens of the eye</td>
<td>blue</td>
</tr>
<tr>
<td>Lining of the digestive tract</td>
<td>purple</td>
</tr>
</tbody>
</table>

27. The endoderm was probably which color?
   a. red and yellow
   b. yellow and green
   c. green and purple
   d. blue and yellow
   e. purple and red

28. Which structure in bird and mammalian embryos functions like the blastopore of frog embryos?
   a. primitive streak
   b. neural plate
   c. archenteron
   d. notochord
   e. somites
29. If an amphibian zygote is manipulated so that the first cleavage plane does not divide the gray crescent, what is the expected fate of the two daughter cells?
   a. The daughter cell with the entire gray crescent will die.
   b. Both daughter cells will develop normally because amphibians are totipotent at this stage.
   c. Only the daughter cell with the gray crescent will develop normally.
   d. Both daughter cells will develop abnormally.
   e. Both daughter cells will die immediately.

30. The shaping of an animal and its individual parts into a body form with specialized organs and tissues is called
   a. pattern formation.
   b. induction.
   c. differentiation.
   d. determination.
   e. organogenesis.