

Part 1. Multiple choice/fill in the blank. Check any and all correct items. There may be zero, one, or more than one correct item in each question. Total points: 40 (each question is worth 4 points, except #1 is worth 8).

1. Which of the following are a natural group? If the group is not a natural group, state why in relation to whether it is monophyletic/polyphyletic/paraphyletic, or some combination.

	why not?
<input type="checkbox"/> Deuteromycetes	_____
<input type="checkbox"/> Yeasts	_____
<input type="checkbox"/> Fungi	_____
<input type="checkbox"/> Algae	_____

2. Rank the order of events leading up to the true plants, with 1 being earliest evolutionarily and 4 being latest.

colonization of land
 development of aerobic respiration
 endosymbiosis of prokaryotic precursor to chloroplasts
 development of cyclic photosynthesis

3. Mycologists place about 14,000 species of fungi into the group Deuteromycetes, including those which cause Athlete's foot. Which feature(s) do all members of the group have in common?

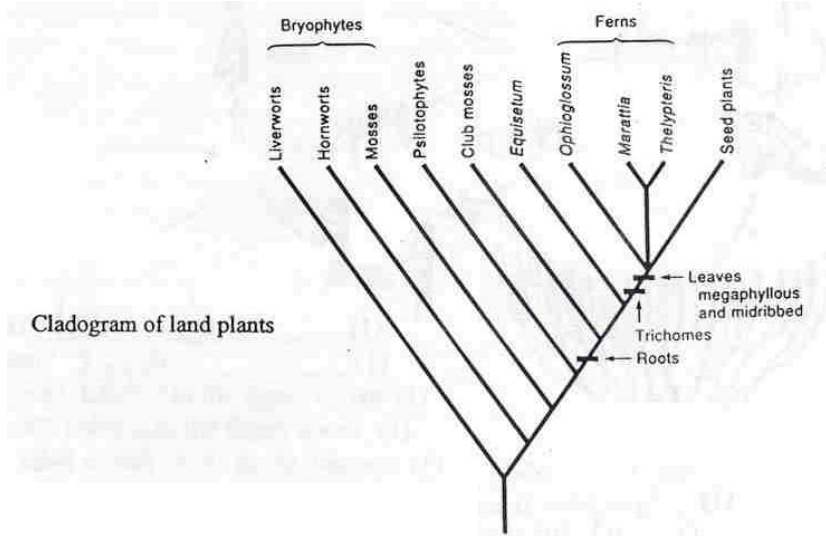
they possess heterothallic mycelia
 they have no known sexual phase
 they are unicellular
 they have complex septa

4. Spores and gametes are different in that

spores are multi-celled, while gametes are always single-celled.
 spores are diploid, while gametes are haploid.
 gametes are always a direct product of meiosis, whereas spore production is not immediately preceded by meiosis.
 gametes directly participate in fertilization, while spores produce a haploid multicelled organism first.

5. Seedless vascular plants such as giant horsetails and giant lycopods came to dominate the landscape of the Carboniferous and Permian periods of the Paleozoic era. Which of the following features, lacking in the bryophytes, contributed to the success of many seedless vascular plants of this time?
- synthesis of lignin in cell walls
 - presence of rhizoids
 - sperm that were not dependent on water for fertilization
 - presence of a central stele, made up of xylem and phloem

6. Examine the cladogram below, and based on it, decide which of the statements below are TRUE.
- This cladogram suggests that club mosses are more closely related to seed plants than are the ferns.
 - The cladogram indicates that Psilotophytes lack roots
 - The cladogram indicates that only ferns and seed plants possess trichomes (hair on the surface of leaves)
 - The cladogram shows that all land plants had a common ancestor.



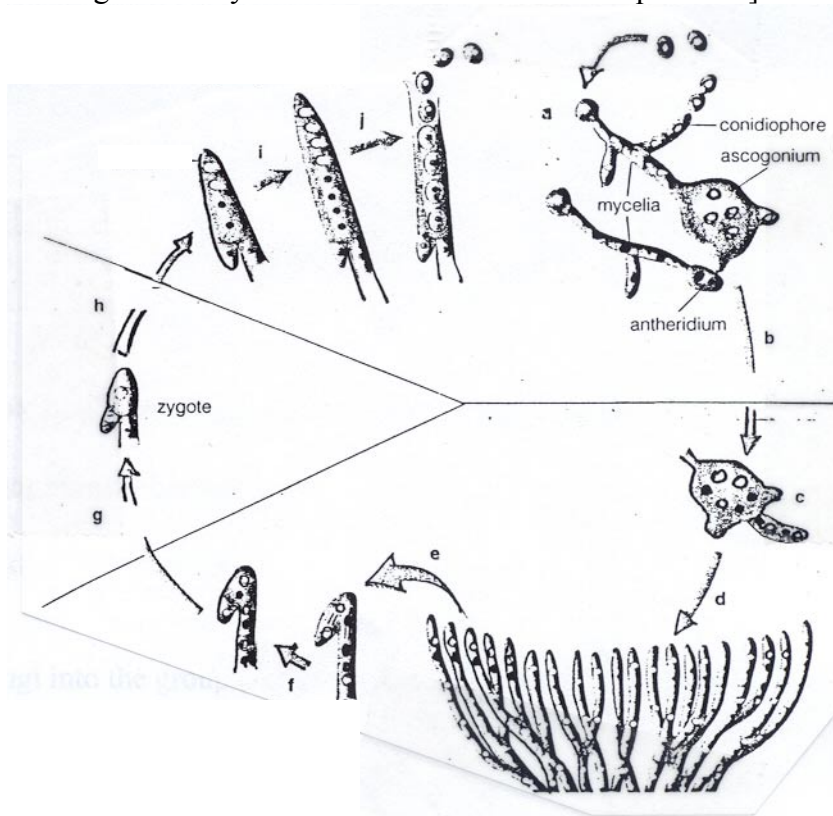
7. Mosses and liverworts differ from vascular plants in that:
- Bryophytes have a $2n$ gametophyte
 - the gametophyte in Bryophytes is the dominant and conspicuous generation
 - the dominant generation in Bryophytes does not have stem tissue differentiated into an epidermis, ground tissue and stele.
 - Bryophytes have a gametic life cycle.
8. One "humongous fungus" in southern Washington is thought to be the largest living organism in the world, spreading over about 1500 acres of forest. Most of its biomass is made up of
- the sporophyte
 - the hyphae
 - the basidia
 - a single mushroom

9. Plant cells differ from animal cells in that plant cells contain which of the following that animal cells do not?

- ___ mitochondria
- ___ plastids
- ___ vacuoles
- ___ circular DNA

Part 2. Short answer

1. Based on the following life cycle, answer the questions below. (10 points) [Ignore the small letters in the diagram – they are not related to the lettered questions].



- a. What phylum of fungus does this represent? _____ (1)
- b. What type of life cycle does this represent? _____ (1)
- c. At what point does plasmogamy take place? Label it in the figure above. (1)
- d. At what point does karyogamy take place? Label it in the figure above. (1)
- e. Is there dikaryotic growth? _____ If yes, label it with “n+n” in the diagram. (1)
- f. What do you call the macroscopic sexual reproductive structure for this type of fungus?
_____ (1)
- g. Circle the meiospores in the figure above and label them as such. (1)
- h. Are the meiospores 1n or 2n? _____ (1)
- i. Do you expect only sexual reproduction in this type of fungus? _____ (1)
- j. What would be the most likely type of mutualism that this type of fungus would form with photosynthetic organisms? _____ (1)

2. (5 points) Our definition of algae was “photosynthetic organisms that are not plants.” Name at least four characteristics that it takes to be a considered a true plant. Which phylum of algae are closest to true plants?

3. (5 points) What two problems of living on land are primarily linked to the competitive advantage for plants to grow taller? How are these problems linked and what is the primary way in which seedless vascular plants solved these problems compared to the Bryophytes?

Part 3. Essay question. Your answer should be clear, concise, complete, and relevant to the question. If your writing is large and you need extra space, use the back of the page. (15 points)

Describe at least one important ecological effect of algae at 1) the global scale; 2) the local scale (e.g., a single lake or estuary); and 3) at the scale of individual interactions (e.g., predation or competition). Which algal groups are involved in each? Are there ways in which some of these interactions might be linked across these broad scales of space and time, or are they relatively independent? How are humans affecting these interactions?