

Directions: Print this exam. Write complete answers to each of the following questions. Use the space provided, under or next to each question; do not attach additional sheets (keep your answers concise, but thorough). Exams are due by Tuesday morning (24 April) at 10 am. Late submissions will not be accepted.

1. (6 pts) What are hyphae, identify the taxon that possesses them, and describe how they are adaptive for the mode of nutrition used by organisms that possess them.

2. (14 pts) Draw a diagram showing the generalized life cycle of Fungi. On your diagram, indicated where the following occur: karyogamy, mycelium, germination, meiosis, plasmogamy, zygote, germination, heterokaryotic stage, spores.

3. (8 pts) List AND describe two different types of mutualist relationships fungi have with other organisms, and two different examples of fungal parasitisms or pathogens.

4. (10 pts) Identify and describe one distinctive feature of each of the following fungal groups:

Chytrids:

Zygomycetes:

Glomeromycetes:

Ascomycetes:

Basidiomycetes:

5. (6 pts) Identify and describe each of the three hypotheses for the origins of major animal clades during the Cambrian Explosion.

6. (6 pts) Contrast acoelomate, pseudocoelomate, or coelomate animals (how is each different from the others?). Also, describe how pseudocoelomates and coelomates are functionally equivalent, and why acoelomate animals are constrained to be flat.

7. (6 pts) Animals referred to as protostomes and deuterostomes experience embryological development in significantly different ways. Describe three of these ways, and identify what specific condition applies to protostome and deuterostome animals, respectively.

8. (20 pts) Construct a cladogram (based upon DNA sequencing) for the following taxa: Platyhelminthes, Cnidaria, Arthropoda, Porifera, Mollusca, Echinodermata, Nematoda, Chordata. Then identify the following monophyletic groups: Bilateria, Ecdysozoa, Eumetazoa, Lophotrochozoa, Deuterostomes. Finally, indicate (on your cladogram) where the following synapomorphies occur: triploblastic, ecdysis, mantle, cnidocytes, jointed exoskeleton, water vascular system, septate coelom, pharyngeal bars and slits. Below your cladogram, briefly describe the adaptive significance for each of the synapomorphies.

9. (12 pts) Identify the correct taxon (as specifically as possible) based upon the given characteristics:

a) Coelom, segmented with septa, setae:

b) Acoelomate, proglottids:

c) Colonial, choanocytes:

d) Collagen, intercellular junctions:

e) Pseudocoelom, ecdysis:

9. (cont.)

- f) Polyp stage only, lives in calcium carbonate skeleton:
- g) Muscular foot modified into tentacles, mantle cavity and siphon for jet propulsion:
- h) Pentaradial, calcareous endoskeletal plates:
- i) Four pairs walking appendages, chelicerae, pedipalps:
- j) Cartilage cranium, slime glands:
- k) Adult with enlarged pharynx, but lacking post-anal tail and nerve cord:
- l) Placoid scales, cartilage endoskeleton:

10. (10 pts) For each of the following synapomorphies, identify which taxon possesses it, and its adaptive significance:

a) Paired pectoral and pelvic fins:

b) Amniotic egg:

c) Stapes:

d) Uric acid:

e) Malleus:

10. (2 pts) In what way do monotremes exhibit an ancestral mode of reproduction, relative to marsupials and placentals?

11. (2 pts) What is *Tiktaalik*, and what is its evolutionary significance?

12. (2 pts) What is *Archaeopteryx*, and what is its evolutionary significance?

13. (15 pts) Construct a cladogram for the following taxa: Actinopterygii, Petromyzontida, Amphibia, Cephalochordata, Reptilia, Latimeria, Chondrichthyes, Mammalia. Identify the following monophyletic groups: Gnathostomata, Tetrapoda, Osteichthyes, Amniota, Chordata, Vertebrata.

On your cladogram, identify where the following synapomorphies occur: Jaws, dorsal hollow nerve cord, paired limbs with 5 digits each, lungs, shelled egg, vertebrae.

14. (2 pts) Defend the following statement: humans are apes.

15. (4 pts) Describe the specific evolutionary trends in locomotion and brain size within the Hominin lineage; at what point did transitions occur?