BIL 160 – Krempels **Spring 2011**

EXAM III

Choose the BEST answer. Two points each.

1. Which of the following was NOT a major problem plants had to overcome in their earliest transition from aquatic to terrestrial life.
   a. desiccation
   b. transfer of sperm from male to female
   c. structural support
   d. protection from herbivores
   e. all of the above were immediate problems for the first land plants

2. Which of the following probably made the evolution of secondary compounds such as toxic tannins and alkaloids MOST advantageous/adaptive for land plants?
   a. the Greenhouse Effect
   b. symbiosis with fungi
   c. evolution of herbivorous insects
   d. a rise in wind pollination
   e. all of the above

3. In plants, the *primary* function of the **stomates** is to
   a. take up water from the atmosphere
   b. absorb nutrients
   c. facilitate fertilization of the ova
   d. facilitate gas exchange
   e. serve as structural support

Choose from among the following terms to best match #44-48.

a. gametophyte b. sporophyte c. sporangium d. pollen e. antheridium

4. If this individual is female, it developed from a megaspore.

5. This is the male gametophyte of either a pine or a rose.

6. Which of the following is homologous to sperm?
   a. **a** and **d**
   b. **d** and **e**
   c. **c** and **d**
   d. **d** only
   e. none of the above

7. In seed plants, which of the following is temporarily contained *directly* inside the other?
   a. **d** inside of **c**
   b. **e** inside of **b**
   c. **d** inside of **e**
   d. **c** inside of **a**
   e. **b** inside of **c**

8. The fern you could have on your bedroom windowsill is one of these.

9. Unlike green algae, land plants
   a. never have flagellated, swimming sperm
   b. retain embryos in maternal tissues during development
   c. lack chlorophyll b
   d. have physically distinguishable (heteromorphic) gametophyte and sporophyte generations
   e. more than one of the above

10. In a plant, which of the following is analogous to the embryonic stem cells of an animal?
    a archegonium
    b. gametophyte
    c. ovum
    d. meristem
    e. spores

11. In a flower, this is the sticky tip of the megasporophyll that acts as a "landing pad" for pollen.
    a. ovulary b. style c. anther d. stigma e. endosperm

12. An apical meristem cell is
    a. multipotent b. pluripotent c. totipotent d. all of the above

13. You have a favorite mango tree in your back yard that produces the world's most wonderful mangos. If you plant a seed from one of these fabulous mangos, and have the patience to wait about ten years for it to flower and fruit, you are very likely to discover that the new tree will produce fruit exactly like that of its parent sporophyte.
    a. true b. false c. what do I look like, a farmer?

14. The correct answer to the previous question is correct because
    a. the scenario described in the question is a type of asexual reproduction
    b. the seed of a plant will be genetically the same as the plant that produced it
    c. a sporophyte embryo is genetically unique and different from its parent plant.
    d. fruit trees are nearly always commercially propagated by growing seeds from fruit
    e. I totally guessed.

15. A **strobilus** is
    a. a stem characteristic seen in large ferns
    b. the compartment in a pollen grain where sperm is manufactured
    c. the collective term for the ring of sepals at the base of a flower
    d. a whorl of sporophylls, such as a pine cone
    e. a whirling, spinning structure that functions to deter herbivores

16. If you believed in the **Doctrine of Signatures**, then you might think a banana could be useful for
    a. treating people suffering from potassium deficiency
    b. studies of parthenogenesis
    c. medical treatment of erectile dysfunction
    d. a healthy snack
    e. slapstick comedy routines

17. Wandering the prairie, you have discovered a tough grass that is flexible, but does not break easily. The structural strength of the plant's leaves is most likely conferred by
    a. parenchyma b. epidermis c. collenchyma d. sclerenchyma e. xylem

18. The *Ficus* tree growing next to your house has finally grown so wide that its trunk is pushing against the wall. This lateral growth is due to cell division in the
    a. cork cambium c. ground meristems e. roots
    b. primary meristems d. vascular cambium

19. The paper on which this exam is printed was made out of fibers extracted from
    a. collenchyma b. parenchyma c. sclerenchyma d. fibroids e. pollen

20. Ground meristem cells can develop into the various types of ground tissue, but—under normal circumstances—will not develop into epidermal or vascular tissues. Ground meristem cells should thus be considered
    a. primitive b. totipotent c. multipotent d. conducting e. haploid

21. You have attached an orchid plant to your favorite Gumbo Limbo tree, but have become frustrated because just when the orchid seems to get its roots attached to the bark, the bark peels off the tree, leaving the orchid with nothing to hang on to. The tree's inconvenient bark peeling is due to growth of the
    a. cork cambium c. apical meristem e. more than one of the above
    b. vascular cambium d. protoderm

22. The developing sporophyll of this plant is curled to form a “fiddlehead”.
    a. liverwort b. pine c. horsetail d. fern e. moss

23. If you are a sloppy gardener, you might accidentally "girdle" your favorite young tree while weed-whacking the lawn around its base. This means that you have cut into the tree's trunk (all around its circumference) deeply enough to completely sever the _____ , and the tree will eventually die because photosynthetic nutrients cannot reach the roots.
    a. heartwood
    b. sapwood
    c. phloem
    d. summer wood
    e. cork cambium

24. The nutrient-bridge *arbuscule* of an endomycorrhizal (V.A.M.) fungus is analogous to the _____ of an ectomycorrhizal fungus.
    a. sporangium
    b. mycelium
    c. vesicle
    d. Hartig net
    e. root

25. Fungi participate in many different types of symbiosis, but they are never known to be
    a. parasitic
    b. parasitoids
    c. predatory
    d. mutualistic
    e. various fungi can be parasites, parasitoids, predators or mutualists

26. The terms "+" and "-" used to describe fungal hyphae are analogous to
    a. parasitic and free-living
    b. septate and non-septate
    c. male and female
    d. mold and yeast
    e. sexual and asexual

27. In exchange for increasing absorptive surface area of its plant partner's roots, the fungus in a mycorrhizal association receives _____ from the plant.
    a. protection from bacteria
    b. protection from its predators
    c. photosynthetically produced nutrients
    d. hormones
    e. all of the above

28. If all the fungi in an ecosystem were to suddenly be removed (*pouf* magic!), which of the following groups of organisms would be the most likely to *benefit* from their absence?
    a. Plantae
    b. Animalia
    c. green algae
    d. bacteria
    e. Alcoholics Anonymous

29. After + and - basidiomycete hyphae fuse during sexual reproduction, the joined cytoplasm remains _____ until _____occurs in the basidia.
    a. haploid; plasmogamy
    b. diploid; meiosis
    c. dikaryotic; karyogamy
    d. diploid; plasmogamy
    e. haploid; plasmogamy

30. If multicellularity is adaptive, and not simply an accident, then the multicellular condition shared by both fungi and animals is probably a result of
    a. common ancestry
    b. convergent evolution
    c. homology
    d. inheritance of acquired traits
    e. harmful mutations

31. An animal that swims rapidly and hunts visually with photoreceptors concentrated at one end of the body is likely to be all of the following EXCEPT
    a. diploblastic
    b. bilaterally symmetrical
    c. cephalized
    d. eumetazoan
    e. coelomate

32. Which of the following combinations of taxon and description is INCORRECT?
    a. Porifera: gastrovascular cavity; true mesoderm; radial symmetry
    b. Cnidaria: radial symmetry, nematocysts, gastrovascular cavity
    c. Ctenophora: longitudinal rows of cilia; refractive index same as water; suspension feeders
    d. Platyhelminthes: incomplete digestive tract; no true mesoderm; bilateral symmetry
    e. Acoelomorpha: no intestine; weak cephalization; bilateral symmetry

33. You are a taxonomist classifying the various bilaterally symmetrical animals. You decide that "vermiform shape" is a good character to use, and place all worm-shaped animals in what you believe to be a monophyletic taxon. This was a great idea, and your worm groups are very likely to be monophyletic.
a. true b. false c. where do you come up with these questions?

Match the appropriate characters with each taxon in questions #34 – 37.

1. true radial symmetry
2. diploblasty
3. distinct cephalization
4. true coelom
5. radial, indeterminate cleavage
6. pseudocoelom

34. Acoelomorpha
a. 1, 2, & 6 c. 1 & 2 only e. none of these choices is correct
b. 1, 3. & 4 d. 3 & 4 only

35. Hexactinellida (glass sponges)
a. 1, 2, & 4 c. 1 & 2 only e. none of these choices is correct
b. 1, 3. & 4 d. 3 & 5 only

36. Scyphozoa (jellyfish)
a. 1, 2, & 3 b. 1, 4. & 5 c. 3, 4 & 5 d. 1 & 2 e. 2, 3, 4 & 5

37. Cestoda (tapeworms)
a. 2 & 3 b. 3 & 6 c. 2, 3 and 6 d. 3 & 4 e. 3 only

38. Which of the following is *unique* to animals?
a. gastrulation c. sexual reproduction e. heterotrophy
b. multicellularity d. flagellated cells

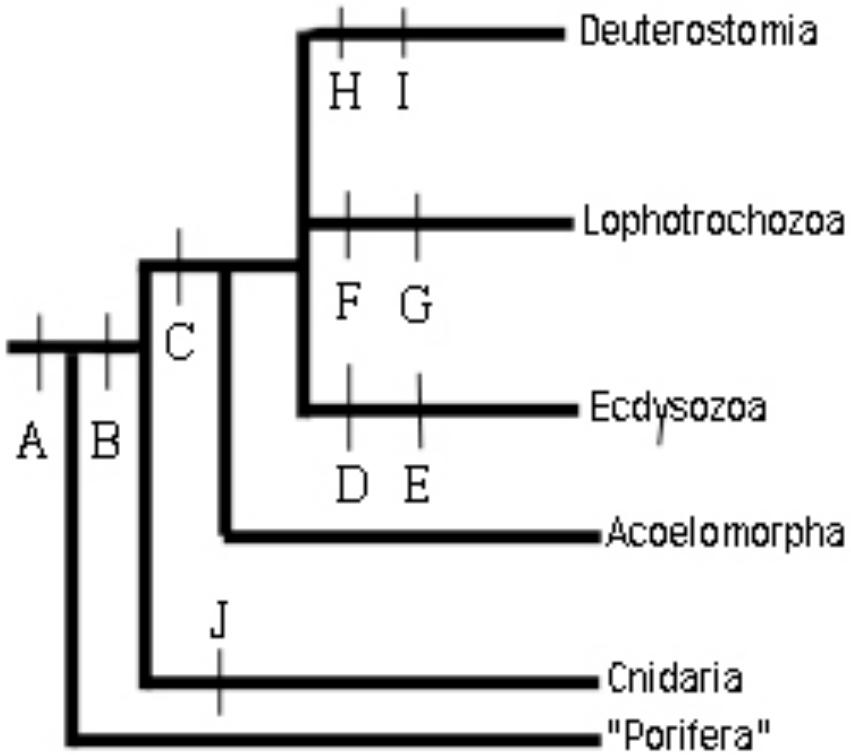
39. If the current molecular evidence regarding animal evolutionary relationships and origins is well substantiated in the future, then what will be true of any evidence from the fossil record that appears to conflict with the molecular-based phylogeny?
a. The fossil evidence will be seen as a hoax
b. The fossil record will be ignored as irrelevant
c. The fossil evidence will be understood to be incorrect because it is incomplete
d. Phylogenies constructed with even a small contribution of fossil evidence will be discarded
e. It will be more valid for creationists to use the fossil record to try and debunk evolution

40. Upon gastrulation, the primordia of this organ system are present, making it the second organ system to appear in an animal embryo.
a. digestive c. muscular c. nervous d. excretory e. circulatory

41. The most primitive Cnidarians (e.g., Hydrozoans) alternate between two life cycle stages. The motile, sexually reproducing phase is known as a _____, and the sessile, (ususally) asexually reproducing phase is known as a _____.
a. veliger; trochophore c. polyp; medusa e. trochophore; tardigrade
b. chelicera; mandible d. medusa; polyp

42. This cell type, thought to resemble the earliest animal ancestor, is present today in sponges, where its function is to create water currents flowing through the internal canals.
a. pinacocyte c. amoebocyte e. spicule
b. choanocyte d. porocyte

Consider the following hypothetical phylogeny of animals to answer #43 - 45



43. The character marked "C" on the tree *could* be _____, but *could not* be _____.
    a. bilateral symmetry; triploblasty
    b. radial symmetry; food vacuole
    c. nervous system; choanocytes
    d. radial cleavage; coelom
    e. pseudocoelom; ocelli

44. Characters "H" and "I" could be
    a. spiral cleavage; dorsal nervous system
    b. radial cleavage; true coelom
    c. ventral circulatory system; diploblasty
    d. metamerism; radial symmetry
    e. diploblasty; gastrulation

45. Judging from the information on the tree, the ancestral bilaterian might have most closely resembled a
    a. sponge
    b. simple chordate
    c. mollusk
    d. acoel flatworm
    e. jellyfish

46. The most recent common ancestor of all animals was probably a
    a. deuterostome
    b. bacterium
    c. fungus
    d. colonial choanoflagellate
    e. fluke

47. Which of the following structures is homologous to and partly derived from the blastocoel?
    a. archenteron
    b. blastopore
    c. pseudocoelom
    d. schizocoelom
    e. mesohyl

You have found marine animal embryo at the eight-cell stage. You notice that one hemisphere of 4 cells (smaller than the cells of the other hemisphere) seem to be rotated 45º relative to the cells in the lower hemisphere, and are nestled in the grooves between the larger blastomeres (spiral cleavage). Use this information to answer #43 – 45.

48. This organism might develop into any of the following marine creatures EXCEPT a(n)
    a. octopus b. fish c. clam d. earthworm e. flatworm

49. If you were to allow the embryo to grow undisturbed, you would expect that
    a. the first opening formed by gastrulation will become the mouth
    b. it will develop into a planula larva, and then grow a vertebral column
    c. it will develop into a solid ball of cells without a central space/blastocoel
    d. both a and b
    e. both b and c

50. But rather than let the little embryo live its peaceful life, you separated its eight cells and placed each in a separate culture to allow normal development, as governed by their cleavage (determinate or indeterminate) at this early stage. What is the most likely result?
    a. each cell will develop into a normal, full-sized embryo
    b. each cell will develop into a smaller-than-average, but normal embryo
    c. each cell will continue to develop, but only into an inviable embryo lacking many parts
    d. each cell will immediately die
    e. each cell will grow into a perfect, miniature replica of vice president Dick Cheney

BONUS QUESTIONS! Two points each. No penalty for wrong answers.

51. If you were an animal living in a very dry environment, you would most likely excrete your excess nitrogen as
    a. ammonia b. urea c. uric acid d. feces e.

52. The middle syllable in the word "apoptosis" is pronounced
    a. "pop" b. "ptu" c. "poh" d. "apo" e. "bwah"

53. Blood cells are components of which type of tissue?
    a. epithelial c. muscular e. matrix
    b. connective d. nervous

54. Your very own abdominal coelomic layer comprises your
    a. gonads c. muscles e. last hope for med school
    b. peritoneum d. blastocoel

If I come back in my next lifetime as an animal, I hope it's some type of parasite, because this is the part where I take it easy!

-- Deep Thoughts by Jack Handey