

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 | d. protection from herbivores |
| b. transfer of sperm from male to female | e. all of the above were immediate |
| c. structural support | problems for the first land plants |

Remember: The first land plants came ashore before any animals were there to eat them.

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 | c. evolution of herbivorous insects | e. all of the above |
| b. symbiosis with fungi | d. a rise in wind pollination | |
3. In plants, the *primary* function of the **stomates** is to
- | | |
|--|-----------------------------------|
| a. take up water from the atmosphere | d. facilitate gas exchange |
| b. absorb nutrients | e. serve as structural support |
| c. facilitate fertilization of the ova | |

Choose from among the following terms to best match #4-8.

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

4. If this individual is female, it developed from a megaspore. **A - gametophyte**
5. This is the male gametophyte of either a pine or a rose. **D - pollen**
6. Which of the following is homologous to sperm?
- | | | |
|--------------------------|--------------------------|-----------------------------|
| a. a and d | c. c and d | e. none of the above |
| b. d and e | d. d only | |

Pollen is a male gametophyte. Antheridium is a male reproductive organ. While both are responsible for producing sperm, they are not homologous to sperm. I mentioned this in class many times, so if you didn't come to class you may not have understood that. See why it's good to come to class?

7. In seed plants, which of the following is temporarily contained *directly* inside the other?
- | | | |
|--------------------------------|--------------------------------|--------------------------------|
| a. d inside of c | c. d inside of e | e. b inside of c |
| b. e inside of b | d. c inside of a | |
8. The fern you could have on your bedroom windowsill is one of these. **B - sporophyte**
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 | c. ovum | e. spores |
| b. gametophyte | d. meristem | |

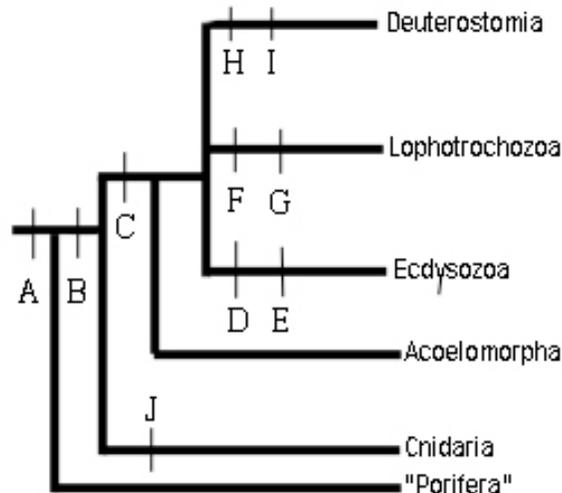
11. In a flower, this is the sticky tip of the megasporophyll that acts as a "landing pad" for pollen.
 a. ovulary b. style c. anther **d. stigma** e. endosperm
12. An apical meristem cell is
 a. multipotent b. pluripotent **c. totipotent** d. all of the above
13. You have a favorite mango tree in your 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?
- Remember: The embryo in the seed is the offspring of the tree, not a clone of it. Do you look (or taste) like your parents? Nope, I didn't think so.**
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 (**don't confuse sporophyll with fiddlehead**)
 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 d. a healthy snack
 b. studies of parthenogenesis e. slapstick comedy routines
c. medical treatment of erectile dysfunction
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 **c. phloem** e. cork cambium
b. sapwood d. summer wood
24. The nutrient-bridge *arbuscule* of an endomycorrhizal (V.A.M.) fungus is analogous to the _____ of an ectomycorrhizal fungus.
- a. sporangium c. vesicle e. root
b. mycelium **d. Hartig net**
25. Fungi participate in many different types of symbiosis, but they are never known to be
- a. parasitic c. predatory **e. various fungi can be parasites, parasitoids, predators or mutualists**
b. parasitoids d. mutualistic
26. The terms "+" and "-" used to describe fungal hyphae are analogous to
- a. parasitic and free-living **c. male and female** e. sexual and asexual
b. septate and non-septate d. mold and yeast
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 d. hormones
b. protection from its predators e. all of the above
c. photosynthetically produced nutrients
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 c. green algae e. Alcoholics Anonymous
b. Animalia **d. bacteria** (AA would go out of business.)
29. After + and - basidiomycete hyphae fuse during sexual reproduction, the joined cytoplasm remains _____ until _____ occurs in the basidia.
- a. haploid; plasmogamy **c. dikaryotic; karyogamy** e. haploid; plasmogamy
b. diploid; meiosis d. diploid; 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 c. homology e. harmful mutations
b. convergent evolution d. inheritance of acquired traits

If multicellularity is adaptive, then this would be an example of convergence, as the most recent common ancestor of both fungi and animals was a unicellular protist.

- 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, (usually) 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 d. radial cleavage; coelom
 b. radial symmetry; food vacuole e. pseudocoelom; ocelli
 c. nervous system; choanocytes
44. Characters "H" and "I" could be
 a. spiral cleavage; dorsal nervous system d. metamerism; radial symmetry
 b. radial cleavage; true coelom e. diploblasty; gastrulation
 c. ventral circulatory system; diploblasty
- Oops. There's no correct answer here! I'm throwing this out, and everyone gets the two points. (FYI, "b" is incorrect because the true coelom possibly originated just after the acoelomorpha branched off. If I had written "enterocoely", then b would have been correct.)**
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 45° 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

The fish is the only deuterostome in this list, and the characters above are protostome or earlier.

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. sand

52. The middle syllable in the word “apoptosis” is pronounced

- a. “pop”
- b. “ptu”
- c. “poh”**
- d. “apo”
- e. “bwah”

(If you came to class, you’d know this one, too.)

53. Blood cells are components of which type of tissue?

- a. epithelial
- b. connective**
- c. muscular
- d. nervous
- e. matrix

54. Your very own abdominal coelomic layer comprises your

a. gonads

b. peritoneum

c. muscles

d. blastocoel

e. last hope for med school