Chapter 25 Exercises

Review Questions

1. The land plants are probably descendants of which group?
- **a.** green algae
- **b.** red algae
- **c.** brown algae
- **d.** angiosperms

2. Alternation of generations means that plants produce:
- **a.** only haploid multicellular organisms
- **b.** only diploid multicellular organisms
- **c.** only diploid multicellular organisms with single-celled haploid gametes
- **d.** both haploid and diploid multicellular organisms

3. Which of the following traits of land plants allows them to grow in height?
- **a.** alternation of generations
- **b.** waxy cuticle
- **c.** tracheids
- **d.** sporopollenin

4. How does a haplontic plant population maintain genetic diversity?
- **a.** Zygotes are produced by random fusion.
- **b.** Gametes are created through meiosis.
- **c.** Diploid spores undergo independent assortment during mitosis.
- **d.** The zygote undergoes meiosis to generate a haploid sporophyte.

5. What characteristic of Charales would enable them to survive a dry spell?
- **a.** sperm with flagella
- **b.** phragmoplasts
- **c.** sporopollenin
- **d.** chlorophyll *a*

6. Which one of these characteristics is present in land plants and *not* in Charales?
- **a.** alternation of generations
- **b.** flagellated sperm
- **c.** phragmoplasts
- **d.** plasmodesmata

7. A scientist sequences the genome of *Chara*, red algae, and a tomato plant. What result would support the conclusion that charophytes should be included in the kingdom Plantae?
- **a.** The *Chara* genome is more similar to the red algae than the tomato plant.
- **b.** All three genomes are distinctly different.
- **c.** The *Chara* genome is more similar to the tomato plant genome than the red algae genome.
- **d.** The tomato plant genome is distinct from the red algae genome.

8. Which of the following features does *not* support the inclusion of charophytes in the kingdom Plantae?
- **a.** Charophyte chloroplasts contain chlorophyll *a* and *b*.
- **b.** Charophyte plant cell walls contain plasmodesmata to allow transfer between cells within multicellular organisms.
- **c.** Charophytes do not exhibit growth throughout the entire plant body.
- **d.** Charophytes are multicellular organisms that lack vascular tissue.

9. Which of the following structures is *not* found in bryophytes?
- **a.** a cellulose cell wall
- **b.** chloroplast
- **c.** sporangium
- **d.** root

10. Stomata appear in which group of plants?
- **a.** Charales
- **b.** liverworts
- **c.** hornworts
- **d.** mosses

11. The chromosome complement in a moss protonema is:
- **a.** 1*n*
- **b.** 2*n*
- **c.** 3*n*
- **d.** varies with the size of the protonema

12. Why do mosses grow well in the Arctic tundra?
- **a.** They grow better at cold temperatures.
- **b.** They do not require moisture.
- **c.** They do not have true roots and can grow on hard surfaces.
- **d.** There are no herbivores in the tundra.

13. A botanist travels to an area that has experienced a long, severe drought. While examining the bryophytes in the area, he notices that many are in the same life-cycle stage. Which life-cycle stage *should* be the most common?
- **a.** zygote
- **b.** gametophyte
- **c.** sporophyte
- **d.** archegonium

14. Microphylls are characteristic of which types of plants?
- **a.** mosses
- **b.** liverworts
- **c.** club mosses
- **d.** ferns

15. A plant in the understory of a forest displays a segmented stem and slender leaves arranged in a whorl. It is probably a _____.
- **a.** club moss
- **b.** whisk fern
- **c.** fern
- **d.** horsetail

16. The following structures are found on the underside of fern leaves and contain sporangia:
- **a.** sori
- **b.** rhizomes
- **c.** megaphylls
- **d.** microphylls

17. The dominant organism in fern is the _____.
- **a.** sperm
- **b.** spore
- **c.** gamete
- **d.** sporophyte

18. What seedless plant is a renewable source of energy?
- **a.** club moss
- **b.** horsetail
- **c.** *Sphagnum* moss
- **d.** fern

19. How do mosses contribute to replenishing nitrogen in the soil?
- **a.** Mosses fix nitrogen from the air.
- **b.** Mosses harbor cyanobacteria that fix nitrogen.
- **c.** Mosses die and return nitrogen to the soil.
- **d.** Mosses decompose rocks and release nitrogen.

20. Megaphylls most likely evolved _____.
- **a.** independently several different times in vascular plants
- **b.** once in vascular plants
- **c.** independently several different times in nonvascular plants
- **d.** once in nonvascular plants

Critical Thinking Questions

21. Why did land plants lose some of the accessory pigments present in brown and red algae?

22. What is the difference between extant and extinct?

23. Describe at least two challenges that cactuses had to overcome that cattails did not.

24. Describe a minimum of two ways that plants changed the land environment to support the emergence of land animals.

25. To an alga, what is the main advantage of producing drought-resistant structures?

26. In areas where it rains often, mosses grow on roofs. How do mosses survive on roofs without soil?

27. What are the three classes of bryophytes?

28. Describe two adaptations that are present in mosses but not hornworts or liverworts, which reflect steps of evolution toward land plants.

29. Bryophytes form a monophyletic group that transitions between green algae and vascular plants. Describe at least one similarity and one difference between bryophyte reproduction and green algae reproduction.

30. How did the development of a vascular system contribute to the increase in the size of plants?

31. Which plant is considered the most advanced seedless vascular plant, and why?

32. Ferns are simultaneously involved in promoting rock weathering while preventing soil erosion. Explain how a single plant can perform both these functions and how these functions are beneficial to its ecosystem.