

Biology 2e

Unit 5: Biological Diversity

Chapter 25: Seedless Plants

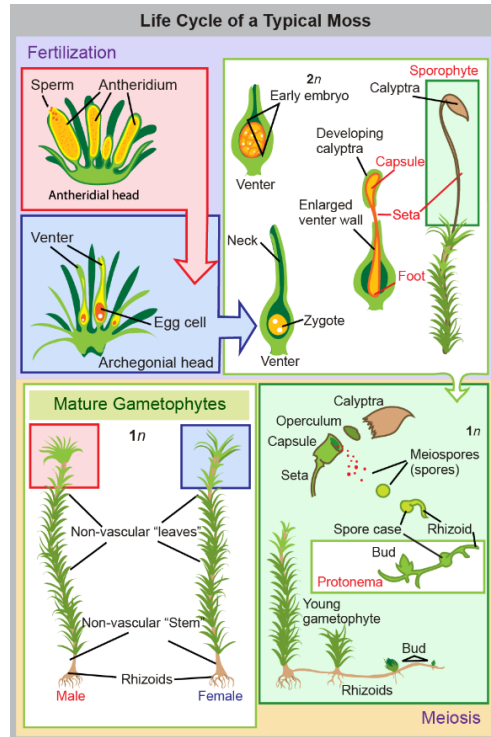
Visual Connection Questions

1. Which of the following statements about plant divisions is false?

STREPTOPHYTES: THE GREEN PLANTS							
Charophytes	Embryophytes: The Land Plants						
	Non-vascular			Vascular			
	Seedless Plants Bryophytes			Seedless Plants		Seed Plants Spermatophytes	
				Lycophytes	Pterophytes	Gymno- sperms	Angio- sperms
				Club Mosses	Whisk Ferns		
	Liver- worts	Horn- worts	Mosses	Quillworts	Horsetails		
				Spike Mosses	Ferns		

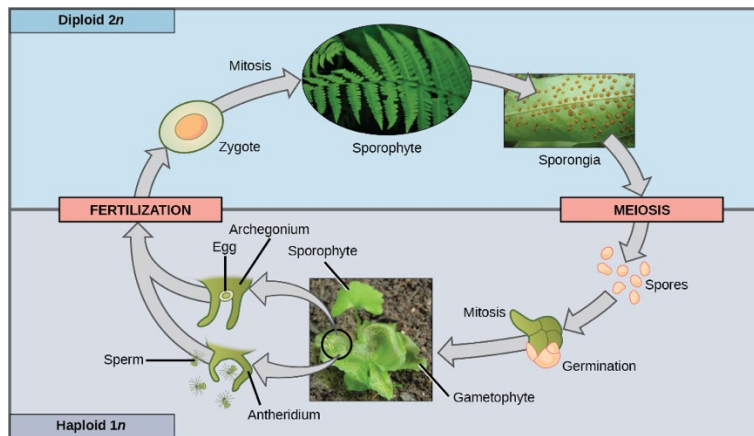
b. All vascular plants produce seeds.

2. Which of the following statements about the moss life cycle is false?



c. The calyptra buds to form a mature gametophyte.

3. Which of the following statements about the fern life cycle is false?



d. Sporangia form on the underside of the gametophyte.

Review Questions

4. The land plants are probably descendants of which of these groups?

a. green algae

5. Alternation of generations means that plants produce:

d. both haploid and diploid multicellular organisms

6. Which of the following traits of land plants allows them to grow in height?

c. tracheids

7. How does a haplontic plant population maintain genetic diversity?

a. Zygotes are produced by random fusion.

8. What characteristic of Charales would enable them to survive a dry spell?

c. sporopollenin

9. Which one of these characteristics is present in land plants and not in Charales?

a. alternation of generations

10. 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 *Plantae* kingdom?

c. The *Chara* genome is more similar to the tomato plant genome than the red algae genome.

11. Which of the following features does not support the inclusion of Charophytes in the *Plantae* kingdom?

d. Charophytes are multicellular organisms that lack vascular tissue.

12. Which of the following structures is not found in bryophytes?

d. root

13. Stomata appear in which group of plants?

c. hornworts

14. The chromosome complement in a moss protonema is:

a. $1n$

15. Why do mosses grow well in the Arctic tundra?

c. They do not have true roots and can grow on hard surfaces.

16. 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?

b. Gametophyte

17. Microphylls are characteristic of which types of plants?

c. club mosses

18. A plant in the understory of a forest displays a segmented stem and slender leaves arranged in a whorl. It is probably a _____.

d. horsetail

19. The following structures are found on the underside of fern leaves and contain sporangia:

a. sori

20. The dominant organism in fern is the _____.

d. sporophyte

21. What seedless plant is a renewable source of energy?

c. sphagnum moss

22. How do mosses contribute to returning nitrogen to the soil?

d. Mosses decompose rocks and release nitrogen.

23. The production of megaphylls by many different species of plants is an example of _____.

a. Parallel evolution

Critical Thinking Questions

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

Sunlight is not filtered by water or other algae on land; therefore, there is no need to collect light at additional wavelengths made available by other pigment coloration.

25. What is the difference between extant and extinct?

Paleobotanists distinguish between extinct species, which no longer live, and extant species, which are still living.

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

Possible challenges include:

- Climate: Deserts are more arid than swamps, so there is less humidity in the air and less water in the soil.
- Reproduction: Cactuses are often not densely populated, whereas cattails occur in groups.
- Temperature: During the day, deserts are usually hot, which increases the risk of desiccation. The desert climate will also have broader temperature ranges (extremes).

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

Possible examples:

- Provided a food source
- Increased oxygen concentration in the atmosphere
- Provided shelter/shade from the sun
- Provided a source of water

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

It allows for survival through periodic droughts and colonization of environments where the supply of water fluctuates.

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

Mosses absorb water and nutrients carried by the rain and do not need soil because they do not derive much nutrition from the soil.

30. What are the three classes of bryophytes?

The bryophytes are divided into three phyla: the liverworts or Marchantiophyta, the hornworts or Anthocerotophyta, and the mosses or true Bryophyta.

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

Potential answers include:

- Mosses exhibit a primitive conductive system in their stalks that transports nutrients and water.
- Mosses exhibit a more complex, multicellular rhizoid system.

32. 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.

Similarities include:

- Sexual reproduction is dependent upon water in which the male gamete swims.
- The haploid organism is the dominant part of the life cycle.

Differences include:

- Bryophyte gametangia protect the gametes and the growing embryo.
- Bryophytes make sporangium to produce spores.

33. How did the development of a vascular system contribute to the increase in size of plants? Plants became able to transport water and nutrients and not be limited by rates of diffusion. Vascularization allowed the development of leaves, which increased efficiency of photosynthesis and provided more energy for plant growth.

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

Ferns are considered the most advanced seedless vascular plants, because they display characteristics commonly observed in seed plants—they form large leaves and branching roots.

35. 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.

A fern roots into the soil through its rhizome system. As the roots work through the top layer of earth, they might encounter rocks and slowly grow through them. This will break the rock down into smaller pieces (weathering), contributing to the ongoing process of the rock cycle. However, the roots will also now form a network that holds the earth in place, preventing erosion. Many other living plants and animals will benefit from the added habitat (ex. dunes on a shoreline).