Chapter 29

Plant Diversity I: The Colonization of Land

1) Bryophytes have all of the following characteristics EXCEPT
   A) multicellularity.
   B) specialized cells and tissues.
   C) well-developed vascular tissue.
   D) a protected, stationary egg cell.
   E) a reduced, dependent sporophyte.

2) A botanist discovers a new species of plant in a tropical rain forest. After observing its anatomy and
   life cycle, the following characteristics are noted: flagellated sperm, xylem with tracheids, separate gametophyte and sporophyte phases, and no seeds. This plant is probably most closely related to
   A) mosses.
   B) conifers.
   C) ferns.
   D) liverworts.
   E) flowering plants.

3) The ancestors of land plants were most likely similar to modern-day members of the
   A) Cyanobacteria (blue-green algae).
   B) Rhodophyta (red algae).
   C) Chlorophyta (green algae).
   D) Phaeophyta (brown algae).
   E) Chrysophyta (diatoms and golden-brown algae).

4) What is one reason why the Chlorophyta are believed to be the ancestors of plants?
   A) Some of their members have developed holdfast, stipe, and blades--ancestral to root, stem, and
      leaves.
   B) They do not have flagellated gametes.
   C) They are the only multicellular algal protists.
   D) They exhibit an alternation of generations.
   E) They have similar chloroplasts and pigment composition.

5) Which of the following organisms do NOT have a jacket of sterile cells that protect developing gametes
and embryos?
A) mosses
B) vascular plants
C) brown algae
D) ferns
E) liverworts

6) Which of the following is the dominant stage in the life cycle of moss?
A) sporophyte
B) gametophyte
C) diploid
D) sporangium
E) flowering stage

7) The term *living fossil* is sometimes used to describe a living member of a mostly extinct group. An
example of a living fossil in the plant kingdom would be a
A) horsetail.
B) bristlecone pine.
C) sunflower.
D) moss.
E) wind-pollinated antiosperm.

8) Which of the following is FALSE about the life cycle of mosses?
A) External water is required for fertilization.
B) Flagellated sperm are produced.
C) Antheridia and archegonia are produced by gametophytes.
D) Gametes are directly produced by meiosis.
E) Gametophytes arise from the protonema.

9) In ferns, what does the spore become?
A) fiddlehead
B) gametophyte
C) rhizome
D) sporangium
E) sporophyte

10) Plant spores give rise directly to
A) sporophytes.
B) gametes.
C) gametophytes.
D) zygotes.
E) seeds.

11) Which of the following was NOT a problem for the first land plants?
A) sources of water
B) sperm transfer
C) desiccation
D) animal preda tion
E) gravity

12) The term *Embryophyta* refers to which characteristic in which of the following groups?
A) flagellated swimming sperm observed in the mosses, liverworts, and hornworts
B) seed formation observed in the gymnosperms and angiosperms
C) spore formation observed in the lycopods and ferns
D) free-living embryos observed in the green algae, Chlorophyta
E) retention of embryos in maternal tissues observed in the Plantae

13) Why are charophyte algae NOT considered to alternate generations during their life cycle?
A) The haploid stage is not dependent on the diploid stage.
B) The diploid stage is not dependent on the haploid stage.
C) The zygote is diploid but is surrounded by nonreproductive cells.
D) The diploid stage is only unicellular.
E) The haploid stage is dominant.

14) Of the following list, flagellated (swimming) sperm are present in which groups?

1. Lycophyta
2. Bryophyta
3. Angiospermae
4. Chlorophyta
5. Pterophyta

A) 1,2,3
B) 1,2,4,5
C) 1,3,4,5
D) 2,3,5
E) 2,3,4,5

15) A number of characteristics are very similar between green algae and the kingdom Plantae' Of the following, which characteristic does NOT provide evidence for an evolutionarily close relationship between these two groups?
A) alternation of genera tions
B) chloroplast structure
C) cell plate formation during cytokinesis
D) sperm cell structure
E) ribosomal RNA base sequences

16) A major change that occurred in the evolution of plants from their algal ancestors was the origin of a
multicellular diploid stage. What advantage would multicellularity provide in this stage of the life cycle?
A) enhanced potential for independence of the diploid stage from the haploid stage
B) increased gamete production
C) increased spore production from each fertilization event
D) increased fertilization rate
E) increased size of the diploid stage

17) Heterospory refers to the condition of some plants in which
A) both male and female reproductive organs are found on the same plant.
B) a single individual exhibits two different types of growth.
C) spores are produced twice during a reproductive cycle.
D) different gametes are produced by the same individual.
E) two different spore types are produced.

18) One of the major distinctions between plants and the algal protists is that
A) only algal protists have flagellated, swimming sperm.
B) embryos are not retained within parental tissues in protists.
C) meiosis proceeds at a faster pace in protists than in plants.
D) chlorophyll pigments in algal protists are different from those in plants.
E) only plants form a cell plate during cytokinesis.

19) Which of the following plant groups is the most abundant on Earth?
A) ferns
B) charophytes
C) hornworts
D) mosses
E) liverworts

20) Based on the available evidence, which of the following algae are the most probable ancestors of
plants?
A) brown algae
B) red algae
C) green algae
D) golden-brown algae

21) All of the following characteristics helped nonseed plants evolve to be adopted to land EXCEPT
A) a dominant gametophyte.
B) vascular tissue.
C) a waxy cuticle.
D) stomata.
E) a branched sporophyte.

22) Which of the following types of plants would have been present in the forests that became today's coal
deposits?
A) horestails *(Equisetum)*
B) lycophytes
C) pine trees
D) tree ferns

23) Which of the following sequences is the most probable in leading to seed plants?

I. brown algae
Il. charophytes
ill. single-celled green algae
N. hornworts
V. plants with a dominant sporophyte

A) t m. V,N
B) m.t v.rv
C) n.rv.m.v
D) m.n.rv. V
E) n.rv. V

24) All of the following are defining characteristics of land plants EXCEPT
A) a cellulose cell wall.
B) a bad taste to vertebrates.
C) chlorophylls *a* and *b.*
D) being photosynthetic autotrophs.
E) being eukaryotic.

25) Which of the following are important structural chemicals at some stage in a plants life? -
A) sporopollenin
B) waxes
C) lignin
D) proteinaceous cuticle
E) cellulose

26) All groups of organisms exhibit substantial variety in one or more of their characteristics. (For
example, mammals have great variety in the structure of their teeth.) In which of the following
attributes are plants particularly diverse?
A) internal leaf morphology
B) waxy cuticles
C) cellulose in cell walls
D) secondary metabolic products
E) types of chlorophyll *a*

27) Which of the following is a TRUE statement about plant reproduction?
A) "Embryophytes" are small because they are in an early developmental stage.
B) Both male and female primitive plants produce gametangia.
C) Gametangia protect gametes from excess water.
D) Eggs and sperm of primitive plants swim toward one another.

28) In the life cycles of all plants, there is an alternation of generations. This means that
A) haploid sporophytes make haploid spores.
B) gametophytes produce spores that develop into gametes.
C) sporophytes and gametophytes are typically similar in appearance.
D) meiosis in sporophytes produces haploid spores.
E) in plants, either the gametophyte or the sporophyte is unicellular.

29) All of the following have similar life cycles EXCEPT
A) ferns.
B) mosses.
C) hornworts.
D) liverworts.

30) Which of the following represent important/ advanced characteristics of the genus *Cooksonia?*
A) leaves and stems .
B) a dominant gametophyte with seeds
C) a reduction in the number of spores and sporangia
D) a dominant gametophyte producing numerous gametes
E) a dominant, branched sporophyte

31) Which of the following is TRUE of seedless vascular plants?
A) The few seedless vascular plants still living are larger and rare.
B) Whole forests were dominated by large, vascular seedless plants.
C) They produce many spores, which are really the same as seeds.
D) Seedless vascular plants are all homosporous.
E) None of the above are true. Vascular plants never form seeds.

32) Which of the following is NOT a characteristic of vascular seed plants?
A) They may be homosporous or heterosporous.
B) The sperm cells must swim through a film of water to reach the egg.
C) Only homosporous plants evolved into seed plants.
D) Antheridia are found on female gametophytes.

33) I£you were building a large,log structure during the Carboniferous period, which plant type(s) would be best to choose?
A) ferns and epiphytes
B) horsetails and ferns
C) lycophytes and *Cooksonia*
D) horsetails and lycophytes
E) None of the above; they were all extinct by the Carboniferous period.

34) Which kinds of adaptations contributed to plants' ability to colonize land?
A) structural
B) chemical
C) reproductive
D) All of the above contributed to plants' colonizing land.

35) All of the following caused botanists to (incorrectly) classify *Psilotum* as the most primitive living plant EXCEPT
A) a dominant sporophyte generation.
B) absence of roots.
C) absence of leaves.
D) comparisons of DNA sequences.
E) its resemblance to *Cooksonia.*