BOT 125 - Plant Morphology
Summer 1996, Final

1. **Read these directions before you begin.**
2. Write your name on your Scantron sheet (**tests without names will not be graded**).
3. Write your ***lab*** section on the Scantron sheet (sect. 1 = MW 12-3, sect. 2 = MW 3-6). **Scantrons without lab sections will have one point deducted from the total.**
4. Check this test to make sure it has all pages, 1–9.
5. Mark all answers on the Scantron sheet. There is *only one* correct answer to each question.
6. When you are finished, turn in the Scantron on the front table. ***Please keep this sheet.***

1. _____ are never flagellated.
   a. Cycadophyta sperm cells
   b. Ginkgophyta sperm cells
   c. Gnetophyta sperm cells
   d. Lycophyta sperm cells
   e. Sphenophyta sperm cells

2. _____ are always diploid.
   a. antipodal cells
   b. microspores
   c. megasporocytes
   d. pollen grains
   e. triple fusion nuclei

3. _____ are always haploid.
   a. meiosporocytes
   b. nucellus cells
   c. sarcotesta cells
   d. tube nuclei
   e. zygotes

4. A bract is a
   a. fascicle of needles
   b. modified leaf
   c. modified stem
   d. rhizome
   e. spur shoot

5. A pollen grain is
   a. a microsporocyte
   b. a microspore
   c. an endosporic male gametophyte
   d. an exosporic female gametophyte
   e. a seed plant sperm cell

6. An ovule can best be described as
   a. a female gametophyte
   b. a megaspore in a fruit
   c. an egg cell inside an archegonium
   d. an immature fruit
   e. an integumented megasporangium

7. A vascular plant has tiny, bract-like leaves and photosynthetic stems. It has no seeds, and strobili with sporangiophores, so it must be a member of the division
   a. Gnetophyta
   b. Lycophyta
   c. Psilophyta
   d. Pterophyta
   e. Sphenophyta

8. Endosporic female gametophytes are found in *all* members of the
   a. Bryophyta
   b. Cycadophyta
   c. Lycophyta
   d. Psilophyta
   e. Pterophyta

9. In Ginkgophyta, ovules are located
   a. in ovaries
   b. in pairs at the ends of slender branches
   c. on cone scales
   d. on megasporophyll
   e. on microsporophylls

10. In heterosporous Lycophyta, gametophytes
    a. are bisexual
    b. are endosporic
    c. are free-living and photosynthetic
    d. have phloem and xylem
    e. always have meiosporangia

11. In *all* seed plants, the pollen tube
    a. absorbs nutrients for the developing sperm
    b. carries the sperm cells to the egg
    c. grows from the stigma down the style to the ovule
    d. grows through the micropyle
    e. is the site of meiosis

12. In Sphenophyta, food-conducting cells are called
    a. hydroids
    b. leptoids
    c. sieve cells
    d. stomata
    e. tracheids

13. In the bisexual exosporic gametophytes of Pterophyta, the antheridia and archegonia often develop at different times. The most important purpose of this is to
    a. form seeds
    b. give the sperm cells the opportunity to turn into new gametophytes
    c. prevent self-fertilization
    d. prevent self-pollination
    e. prolong the breeding season

14. In the vascular plants, zygotes
    a. are haploid
    b. are the product of syngamy
    c. undergo meiosis to form meiospores
    d. turn into gametophytes
    e. are replaced by ovules

15. Insect pollination
    a. is common in conifers
    b. is found in *all* flowering plants
    c. is never found in flowering plants
    d. reduces hybridization
    e. requires more pollen grains per ovule than wind pollination

16. Leafy liverworts
    a. are heterosporous
    b. are less common in the tropics, more common in temperate regions
    c. have no midribs on their leaves
    d. produce gametophytes with short meisporangia and elaters
    e. produce sporophytes with long setae and peristomes

17. Once again, you are eating California Creamy Cow Custard nutrition-free partially-frozen artificially brown-flavored milk-like dessert (you can't get enough of that good brown flavor). You listen carefully as friend says, "Try this chocolate. It's made from the fruit and seeds of an *actual plant*, a woody tropical tree, and even though it's junk food, it's healthier than the stuff you're eating." What Class is the source of chocolate?
    a. Anthophyta
    b. Liliopsida
    c. Lycopodiopsida
    d. Magnoliopsida
    e. Muscopsida

18. One important feature of the vascular plants is branched sporophytes. Why?
    a. Branched sporophytes can produce more archegonia
    b. Branched sporophytes can produce more meiosporangia
    c. Branched sporophytes don't need vascular tissue
    d. It eliminates the need for gametophytes
    e. It prevents self-fertilization

19. Organisms of the division Chlorophyta
    a. always have multicellular gametophytes
    b. have chitin cell walls
    c. have chlorophyll c and α-carotene
    d. have peptidoglycan cell walls
    e. store food as starch

20. Pick the group of divisions that is in the correct order, from the *most* abundant and ecologically important to the *least* abundant and ecologically important:
    a. Anthophyta, Coniferophyta, Pterophyta, Ginkgophyta
    b. Anthophyta, Ginkgophyta, Coniferophyta, Pterophyta
    c. Coniferophyta, Ginkgophyta, Psilophyta, Anthophyta
    d. Ginkgophyta, Psilophyta, Anthophyta, Pterophyta, Gnetophyta
    e. Ginkgophyta, Psilophyta, Pterophyta, Coniferophyta, Anthophyta

21. Seeds and pollen together provide an important and novel adaptation:
    a. embryonic sporophytes
    b. endosporic gametophytes
    c. completely internal fertilization
    d. the ability to live on land
    e. vascular tissue

22. Sori are
    a. clusters of antheridia
    b. commonly located on the lower surfaces of the leaves of leptosporangiate ferns
    c. located on sporangiophores
    d. produced inside meiosporangia
    e. types of indusia

23. Sperm cells of the Ginkgophyta have ___ flagella.
    a. 0
    b. 1
    c. 2
    d. 4-8
    e. more than 12

24. *Spirogyra* of the Chlorophyta exhibits "conjugation". The cell that results from conjugation is a(n)
    a. asexual spore
    b. gamete
    c. meiospore
    d. meiosporocyte
    e. zygote

25. The _____ is a sheet of cells that forms between the primary xylem and primary phloem, and in the areas of parenchyma cells between the vascular bundles.
    a. endodermis
    b. epidermis
    c. rhizoid
    d. stele
    e. vascular cambium

26. The Anthocerotopsida
    a. are called “mosses”
    b. are called “stoneworts”
    c. have air-filled intercellular spaces in their gametophytes
    d. have elaters
    e. have no sporophytes

27. The best evidence for the amount of evolutionary kinship between any two organisms is
    a. how primitive or advanced they are
    b. the homologies they share
    c. their place in the classification in the book
    d. their place on a cladogram
    e. their similar fossils

28. The calyptra of Muscopsida
    a. consists of short filaments of cell wall material
    b. contains conductive cells
    c. is an important adaptation for spore dispersal
    d. is made of diploid cells
    e. is the remains of the archegonium sterile jacket

29. The cell walls of the Kingdom Plantae are mainly cellulose, but there is another important cell wall material in the vascular plants:
    a. chitin
    b. lignin
    c. peptidoglycan
    d. silica
    e. suberin

30. The center of the stems of Sphenophyta is ordinarily filled with
    a. air
    b. parenchyma cells of the cortex
    c. parenchyma cells of the pith
    d. phloem
    e. xylem

31. The common food storage product of the Muscopsida is
    a. floridean starch
    b. glycogen
    c. mannitol
    d. paramylon
    e. starch

32. The common food transport product of the Anthophyta is
    a. glycogen
    b. lipid
    c. mannitol
    d. paramylon
    e. sucrose

33. The dicots (Class Magnoliopsida) are paraphyletic because
    a. their common ancestor is also the ancestor of the monocots
    b. they are more closely related to birds than they are to lizards
    c. they are more closely related to gymnosperms than they are to angiosperms
    d. they have no common ancestor
    e. they have two cotyledons

34. The opening in the integument of an ovule through which the pollen passes is called the
    a. megaphyll
    b. meiopyle
    c. microphyll
    d. micropyle
    e. microspore

35. The Ophioglossophyta
    a. are completely extinct
    b. are heterosporous
    c. have leptosporangia
    d. may be descendents of the Progymnosperms
    e. produce seeds

36. The roots of Psilophyta
    a. come from branching rhizomes
    b. don’t exist
    c. form a taproot system
    d. have protosteles
    e. have rhizoids

37. The single living species of the Ginkgophyta is
    a. *Ginkgo biloba*
    b. *Ginkgo cerevisiae*
    c. *Ginkgo infestans*
    d. *Ginkgosporoides chinensis*
    e. *Gnetum antisyphiliticum*

38. The sporangia of the Lycophyta are borne on
    a. ovules
    b. sporangiophores
    c. the sides of cone scales
    d. the top surface of sporophylls
    e. the underside of compound leaves

39. The sterile jacket of the oogonium of *Chara* is probably an adaptation
    a. to allow colonization of the land
    b. to prevent fertilization
    c. to produce vascular tissue
    d. to protect the zygote
    e. to provide nutrients to the developing sporophyte

40. The structure at the opening of a moss capsule that consists of teeth that flex with changes in humidity is called a
    a. calyptra
    b. elater
    c. operculum
    d. peristome
    e. seta

41. Typical seeds consist of ___ generation(s): _____.
    a. 1 ... a gametophyte only
    b. 2 ... an embryonic gametophyte and its gametophyte parent
    c. 3 ... an embryonic sporophyte, its gametophyte parent, and its sporophyte grandparent
    d. 4 ... an embryonic gametophyte, its sporophyte parent, its gametophyte grandparent, and its sporophyte great-grandparent
    e. 5 ... an embryonic sporophyte, its gametophyte parent, its gametophyte grandparent, its sporophyte great-grandparent, and its ex-wife from Encino.

42. *Volvox* of the Chlorophyta is
    a. a hollow, spherical colony
    b. a single large multinucleate cell with many flagella
    c. a stage leading to multicellular animals
    d. a stage leading to the multicellular Plantae
    e. the closest relative of the Bryophyta

43. We know that the Anthophyta are a monophyletic group (they all descend from a common ancestor) because they all have
    a. endosporic gametophytes
    b. flowers
    c. non-motile sperm
    d. seeds
    e. xylem

44. You are reading an article in *American Journal of Botany* about a newly discovered Division of seed plants. They have many unique features, but you are *not* surprised to find that
    a. they have a diploid nucellus
    b. they have haploid sporophytes
    c. they have no vascular tissue in their sporophytes
    d. they are homosporous
    e. they have bisexual gametophytes

45. You are taking a lab exam. The card says "What division does this heterosporous vascular plant belong to?" There is a microscope, but, strangely, the slide is missing. The correct answer is:
    a. Anthophyta
    b. Coniferophyta
    c. Lycophyta
    d. Pterophyta
    e. there is no way to know

46. You are taking a lab exam. The next station is a sectioned *Ginkgo* seed. The card says "What is the name of the haploid structure at the pin?" But the pin is missing. What is the right answer?
    a. embryo
    b. female gametophyte
    c. nucellus
    d. sarcotesta
    e. sclerotesta

47. You are taking a lab exam. The slide is labeled "*Meconopsis*" and the question is "What is the ploidy level of the integument at the pointer." What should you answer?
    a. diploid
    b. haploid
    c. no answer—we don't have to know genera, and without the Division, there is no way to know the ploidy level.
    d. seed
    e. sterile jacket

48. You are trapped inside the single cotyledon of a Liliopsida embryonic sporophyte within a seed. You have been provided with a dull razor blade and must hack your way out. Name the layers you will cross in order to reach freedom (not including the cotyledon you are already in).
    a. archegonium, antheridium, meiosporangium, perithecium, ascus
    b. endosperm, nucellus, inner integument, outer integument, pericarp
    c. female gametophyte, megasporangium, megaspore cell wall, integument
    d. female gametophyte, megaspore cell wall, megasporangium, integument
    e. nucellus, endosperm, megaspore cell wall, integument, pericarp

49. It is the year 2001. You are trapped inside the newly built Biological Sciences greenhouse at Cal Poly over a long holiday weekend. While searching for food, you find a dozen green bean plants, the same cotyledonous *Phaseolus* that you looked at in lab, and they are covered with fruits. You hungrily gobble up the mature beans. You have eaten cells that are
    a. diploid only
    b. diploid and triploid
    c. haploid, diploid, and triploid
    d. haploid and diploid
    e. triploid only

50. The fog system turns on and you take shelter under the broad leaves of a tropical flowering plant. You sneeze as pollen drifts down from its flowers. The flowers are part of a _____ and the pollen grains are _____.
    a. gametophyte . . . sperm cells
    b. gametophyte . . . sporophytes
    c. seaweed . . . conceptacles
    d. sporophyte . . . gametophyte
    e. sporophyte . . . sperm cells