

### Botany 400 Exam 3 potential questions

1. The Asterids (excluding the Lower Asterids) are one of the best defined groups of flowering plants. Indicate clearly (1) how they can be separated from Rosids, and (2) how the Lower Asterids differ generally from the typical Asterids.
2. What is known about the developmental origin of "sympetaly" in Asterids, and how does such variation in origin fit with the two main groups of Asterids and with Asterids that lack petal fusion?
3. Certain features within the Asterids are fairly good in defining subgroups (orders or sets of families), although most show some homoplasy. Discuss how the following features actually do or do not tie together orders or families: (a) inferior ovary, (b) pollen presentation, (c) opposite leaves, (d) tendency for congested inflorescences ("heads").
4. If you are holding a radiate head like a sunflower, describe all the structures (bracts, florets, etc.) you will see from the outside to the inside.
5. The ancestral aquatic monocot (now extinct of course) has been argued to possess leaves without blades and an inactive vascular cambium (for secondary growth). If this is correct, describe how monocots have been successful in dealing with both of these deficits.
6. The "primitive" monocot flower is considered to possess 3 sepals, 3 petals, 6 stamens, 3+ separate carpels with nectar and insect pollination. Give **two** examples, one in Alismatids and one in Commelinids, how floral reduction and loss of insect/nectar pollination is a recurrent theme in monocot evolution. Indicate **both** the type of pollination and the change in flowers/inflorescence that have accompanied the shift in pollination.
7. Compare and contrast the inflorescence structure, bracts, and florets of a typical grass like *Avena* (oats) and *Carex* (sedge).
8. What are the main types of approaches in biogeography?
9. Vicariance and dispersalism are often considered to be the two main paradigms within one such approach - historical biogeography. Using *Fuchsia* from the new world and old world, discuss how the two paradigms are or are not involved in determining where species of *Fuchsia* are presently found.

10. The temperate floras (and faunas) of the temperate southern hemisphere - South America, Africa, and Australasia - have long been a model group for the debates on vicariance vs. dispersal. Which temperate southern hemisphere continent is most distinct floristically and why?
11. Molecular systematics, although clearly important in modern phylogenetics, has several issues that must be recognized and dealt with. In the context of *Gene Trees* and *Species Trees*, explain how gene duplications, hybridization/introgression, and horizontal gene transfer occur and what must be done to recognize their occurrence.
12. What are three possible ways that a significant discrepancy arises in species numbers between sister clades.
13. Define "Adaptive Radiation" and discuss how molecular phylogenetics is key to understanding this event.
14. Illustrate the phenomenon of Adaptive Radiation with the following examples: (a) cichlid fishes of East Africa; (b) *Salvia* (sages) of mint family; (c) Hawaiian Lobeliaceae.
15. Know the basic land plant extant phyla and place in order (oldest to most recent) their appearance in the fossil record: Bryophyta, Equisetophyta, Lycopodiophyta, Magnoliophyta, Pinophyta, Polypodiophyta.
16. What are some of the important land plant adaptations that occurred in the Ordovician and early Devonian?
17. What are some of the major extinct plant lineages?
18. What is known, using DNA data, about the ancestors of land plants, how the bryophytes are related to vascular plants, and what the basal vascular plants are?
19. Two of the major surprises of land plant evolution are the molecular phylogenetic placements of Psilophyta (whisk ferns) and Equisetophyta (horsetails). Where are they now placed?