

Botany 400 Exam 3 potential questions

1. What are some of the basic ecological conditions that promote the evolution of parasites, of carnivores, and of mycotrophs? [think of a chart showing 4 basic requirements for life on land for plants]
2. What is the difference between holoparasites and hemiparasites? Indicate what is known about the evolution of these two conditions in light of the two families Scrophulariaceae and Orobanchaceae.
3. 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.
4. 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?
5. How has the "head" inflorescence that mimics a flower evolved convergently in Asterids? Besides the Asteraceae, what are some other families that have achieved this unique and successful feature?
6. 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.
7. 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.
8. 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.
9. Compare and contrast the inflorescence structure, bracts, and florets of a typical grass like *Avena* (oats) and *Carex* (sedge).
10. What are the main types of approaches in biogeography?

11. What is a disjunct distribution? Vicariance and dispersalism are often considered to be the two main paradigms in explaining such a distribution. 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.
12. 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?
13. 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, and horizontal gene transfer occur and what must be done to recognize their occurrence.
14. What are three possible ways that a significant discrepancy can arise in species numbers between sister clades.
15. Define "Adaptive Radiation" and discuss how molecular phylogenetics is key to understanding this event.
16. Illustrate the phenomenon of Adaptive Radiation with the following examples: (a) cichlid fishes of East Africa; (b) Hawaiian Lobeliaceae.
17. Know the basic systematic/evolutionary issues and conclusions from the "future systematist" presentations on Wednesday, Dec. 12.