

Study Guide for Midterm #3 Biology 204, Fall 2010

General tips

Know definitions of terms, but, as importantly, know how to apply the relevant concepts to real world situations and examples. Be able to recognize how examples illustrate the main concepts. What are the various predictions, implications, expectations that follow from those concepts? Be able to distinguish among and relate key concepts in real world situations.

Protists – Chap. 29

Define the characteristics of the “kingdom” Protista. What different types of organisms are included in this group? Are they biochemically more diverse than prokaryotes? Are they morphologically more diverse than prokaryotes? Is Protista really a Kingdom? Why or why not? What is a natural group and how does it relate to this question? Be able to recognize the type of protist (protozoan, algae, fungus-like protist) from a description of an organism. Are these natural groups? How are protists related to animals, plants and fungi? What implications does this have for Linnean taxonomy compared to a phylogenetic way of thinking? How is this related to the theory of endosymbiosis, including secondary endosymbiosis? How are these latter concepts related to the distribution of key physiological traits (e.g., photosynthesis) throughout the taxa of protists? What is the evidence for endosymbiosis as the origin of mitochondria and chloroplasts? What is secondary endosymbiosis, and what types of evidence are used to support it?

What are some of the key ecological roles of the protists and what are examples of each? Which are similar to and different from those of the prokaryotes? How are these roles related to the ways in which protists get their food?

Know the steps of the three basic life cycles and understand how the three types differ from one another, and which major groups of organisms have which types. Be able to look at a schematic of a life cycle and know which type it is, as well as which phases are haploid vs. diploid, dominant vs. subordinate, important for dispersal, make gametes vs. make spores. What is “alternation of generations” and what are the three variations on that type of life cycle?

Plants – Chaps. 30

What are some of the key plant functions and what structures are responsible for those functions? Where do plants get the major resources they need to photosynthesize and grow? In what ways do land plants differ from algae (e.g., Chlorophyta) in those structures? What are the Charophyceans and how are they related to the green algae and the plants? What are some of the defining characteristics of land plants and which ones are shared with other algae vs. being representative of the land plants only? What is the evolutionary significance of those defining characteristics with respect to the adaptations of plants for living on land? What is an embryophyte? In what primary ways are plants important ecologically and for human society? What are some of the problems associated with living on land (i.e., in air), and how are these solved along the major steps of plant evolution?

What are the Bryophytes and what are some of their general characteristics? What are at least three important ecological roles of bryophytes? Be familiar enough with the structure and general life cycle of the bryophytes that you would be able to answer fundamental questions about them.

What are examples of currently living seedless vascular plants (SVP's)? What's new evolutionarily with the SVP's? What problems of living on land have the SVP's solved and which have they not solved? What's a cuticle, and what additional adaptations are necessary with cuticles? What are tracheids and vessels? What function(s) do they serve and how are these functions related to lignin, light competition, and cuticles? What is heterosporous, how does it work, and who has it?

What is new with the seed plants? What is a seed? What is pollen? What is an ovule? How do these structures relate to the general plant life cycle? What is secondary growth? What are the five phyla of gymnosperms? How do these compare in terms of species diversity and overall abundance? Given the lack of diversity in conifers relative to flowering plants, are they still ecologically and economically important?

In what ways? Be familiar enough with the conifer life cycle that you can answer fundamental questions about it and know how it relates to the life cycles of SVP's and bryophytes. What problems of living on land have the gymnosperms solved and how?

What are the two largest groups within the Angiosperms? Are they natural groups? What traits are used to characterize them? What are the parts of the flower and how do they relate to functionally similar structures in the other plant groups that we've studied? What is a fruit, where does it come from developmentally, and why is it an improvement in its main function compared to what happens in the gymnosperms? What is coevolution and how is this related to the radiation of angiosperms? What's new with the angiosperm life cycle? Be familiar enough with the angiosperm life cycle that you can answer fundamental questions about it and know how it relates to the life cycles of the other plant groups that we've studied. In what ways are angiosperms important ecologically and for humans directly?

What are the four main evolutionary trends we discussed? In which plant groups do the major transitions in those trends occur? How do these trends relate to the problems of living on land that we discussed before?

Fungi – Chap. 31

Distinguish the following terms: spore, sporangium, fruiting body, hypha, mycelium. Why are the latter two important for the fungal lifestyle? Describe how fungal hyphae gain nutrition and grow. How is this similar to and different from animals? How is the fungal lifestyle related to the key ecological roles and economic impacts of fungi? Why are fungi so critical for decomposing wood? (You don't need to know the enzyme names, but do be familiar with the overall process).

Know the features of the following fungal phyla (including the diagnostic cell of each): Chytridiomycota, Zygomycota, Ascomycota, Basidiomycota. Why is the Deuteromycota not a true phylum? You do not need to know the details of their life cycles, but you should know the diagnostic features (i.e., differences in fruiting bodies, where present, important reproductive cells, importance of dikaryotic (heterokaryotic) growth). What are plasmogamy and karyogamy? For each of the three terrestrial phyla, you should know the main economic and ecological importances, if any.

Describe what is meant by the following fungus life forms, including which types of organisms are involved: yeasts, molds, endophytes, mycorrhizae, lichens. Understand the economic or ecological importance of each, including examples. What is a symbiosis and what are the different categories? For symbiotic relationships that fungi have with other organisms, know the particular organisms involved, what is the advantage to the fungus and what is the advantage or disadvantage to the associated organism? For mutualisms, know the "currencies" of the trade between fungi and their partners, as well as the ecological importance of those relationships.

Chapter 32 – Animals

What are the basic characteristics of animals? What are at least four reasons that animals are important (besides that "they're cool.") What are the two main themes of animal evolution? Which phylum of animals "rules the world", at least in terms of species diversity? Describe the morphological characteristics used to classify animals (symmetry, coelom, protostome/deuterostome development, diploblast/triploblast). What are the three main developmental differences between protostomes and deuterostomes? Describe the probable common ancestor of all animals. What is a "tube within a tube" body plan and which animals, in addition to worms, have it? What does it mean to be a bilaterally symmetric coelomic triploblast with either protostome or deuterostome development? Which animals are like this and which are not? Be able to discuss the costs and benefits of the evolutionary changes that we see throughout the animal phylogeny (true tissues, bilateral symmetry, coelom). Why was the evolution of cephalization correlated with the evolution of bilateral symmetry?

What is the main basis for evolutionary diversification among the animals? How does this compare with the main basis for evolutionary diversification among the plants? What are the four main animal feeding types and what are some examples and adaptations of each? What are the differences

between herbivores, detritivores, carnivores, and omnivores? What's the difference between a sit-and-wait predator and a stalk-and-capture predator? What is the difference between an ectoparasite and an endoparasite? What are some examples of each, including key adaptations? What are the three main types of skeletons that we've encountered and what function(s) do they serve? Why is movement an important feature of animal ecology and evolution? What are some advantages of jointed limbs? In which group(s) are they found, and are jointed limbs shared by these groups' common ancestor? Are limbs in general (not just jointed ones) homologous in animals? What is the basic life cycle of all animals? Be able to sketch it and know the different steps. Both terrestrial plants and terrestrial animals have solved the problem of gamete desiccation during fertilization. What are some similarities and differences in how this is done? What is metamorphosis? What are the differences between and advantages and disadvantages of holometabolous metamorphosis and hemimetabolous metamorphosis? What are some examples of each?