Bio 101: Plant Evolution (Karoly)
Midterm Review

REVIEW SESSION: will be held Sunday (Sept. 26) in Vollum Lecture Hall from 7:10-8:00 PM: bring your questions.

VOCABULARY: the third page includes a list of terms, organized by chapters in the text. These terms have been used in the reading, lab, and lecture, and should be terms that have meaning for you.

STUDY GUIDLEINES: information provided below is meant to give you an outline to guide your studying of the materials covered in lecture, lab, and the reading from the text. It is only a guideline and is NOT meant to serve as an exhaustive list of those areas discussed in class during the last four weeks that may be covered on the exam.

The following is a list with some of the key concepts we discussed. Be prepared to describe how the terms that are joined together in the list are similar and how they are distinct, and be prepared to provide examples where appropriate.

homology/homoplasy
monophyletic/polyphyletic/paraphyletic
meiosis/mitosis
meiosis/fertilization
haploid/diploid
spore/seed
spore/pollen grain
homospory/heterospory
sporophyte/gametophyte
allopatric/parapatric/sympatric speciation
prezygotic/postzygotic isolating mechanism
natural selection/non-random mating/genetic drift/gene flow/mutation
allele frequencies /genotype frequencies
biological species concept/ morphological (phenetic) species concept
apomorphy/plesiomorphy
syanapomorphy/autapomorphy
cladistics/phenetics

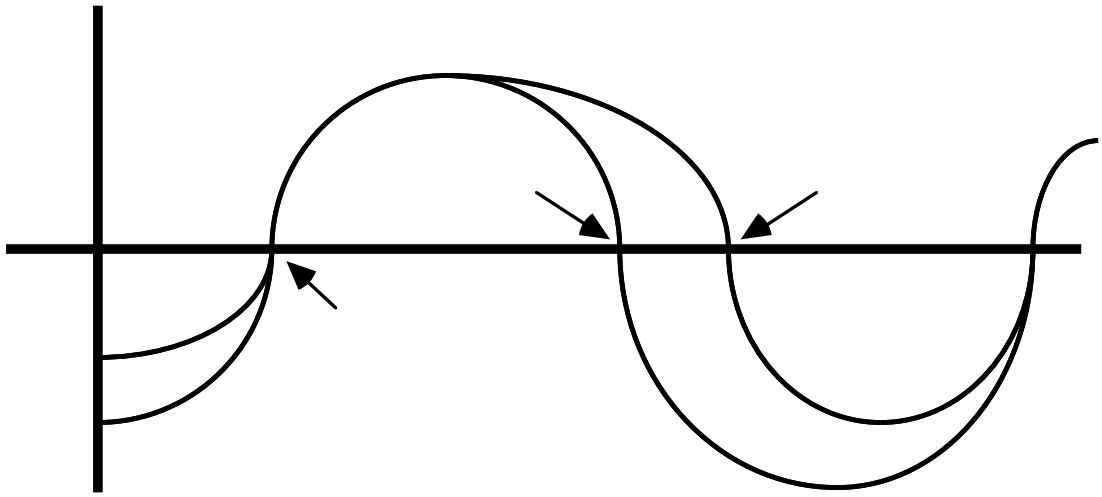
Be prepared to describe the historical context in which the different major plant groups (10 phyla) arose and diversified. What is a plant and how do they differ from their algal relatives? How has the reproductive biology of the major plant groups contributed to their success in the terrestrial environment? What is the relative diversity of the current taxonomic groups of plants and what factors could account for any pattern to this diversity?

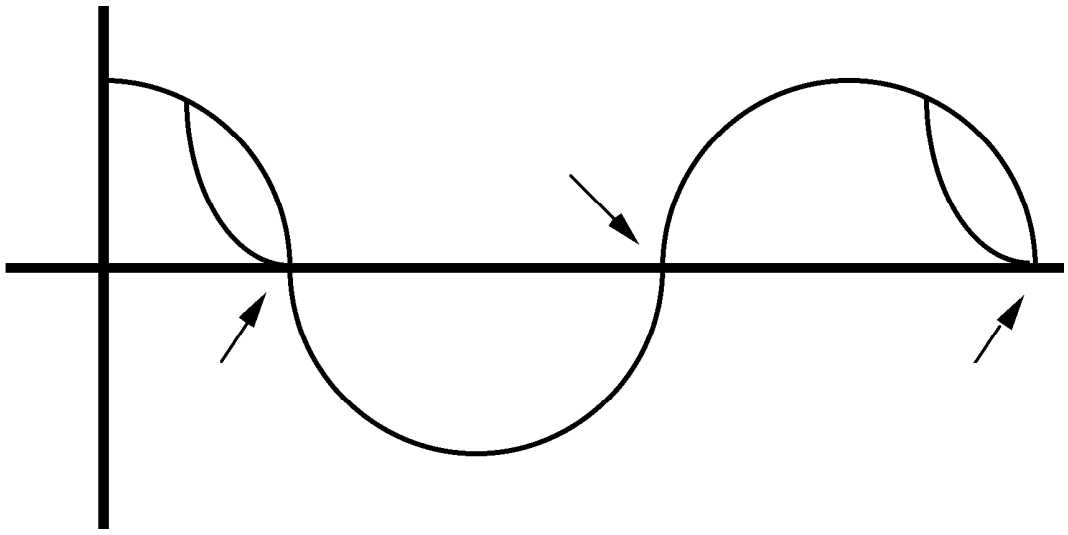
Be prepared to describe the basic Hardy-Weinberg model and connect the evolutionary mechanisms with the assumption(s) they are violating and to describe how violations involving each mechanism will result in evolutionary change in terms of divergence between populations, and thereby contribute to speciation and diversification. Be prepared to calculate allele and genotype frequencies. For drift and selection, be prepared to describe the dynamics and relationships we observed in lab. How do these evolutionary mechanisms contribute to understanding the process that leads to the formation of new species (and to species definitions)?

Be prepared to discuss the relationship(s) between taxonomy and phylogeny, and the roles of homology and homoplasy when studying both taxonomy and phylogeny. What information is contained in the nodes and branches of a phylogeny, and how can patterns of relatedness be interpreted from the tree? How do methods of phylogeny reconstruction differ in their analysis and how they treat data that describe the pattern of similarity among organisms.

Be prepared to describe the basic life-cycle for the plant kingdom (alternation of generations), the ancestral condition in algae from which the plant kingdom is derived, and the way this life-cycle is modified in the four major plant groups we studied in lab. Be prepared to compare and contrast for each: the stage that is prominent, the degree of interdependence between stages, the stage of dispersal, and the means of sperm transport.

Use the figures below to identify the major stages for a homosporous and a heterosporous plant (note that you will first need to decide which is the haploid and which is the diploid phase)





Chapter 20
allele
genotype
gene locus
allele frequency
genotype frequency
gamete pool
mutation
genetic drift
natural selection
nonrandom mating
gene flow
population bottleneck
founder effect
dominant
recessive
heterozygote advantage
neutral variation
adaptation

Chapter 21
morphological (phenetic) species concept
biological species concept
speciation
allopatric speciation mode
parapatric speciation mode
sympatric speciation mode
hybridization
polyploidy
autopolyploidy
allopolyploidy
reproductive isolating mechanisms
prezygotic
postzygotic

Chapter 23
species
taxon (taxa)
taxonomy
taxonomic hierarchy
dichotomous key
homology
homoplasy
phylogeny
clade
monophyletic
polyphyletic
paraphyletic
most recent common ancestor
molecular clock
branch
node
terminal taxa
apomorphy
plesiomorphy
polarity
synapomorphy
autapomorphy
symplesiomorphy
mosaic evolution
outgroup comparison
parsimony
cladistics
phenetics (numerical taxonomy)

Chapter 27
meiosis
mitosis
haploid
diploid
fertilization
zygotic meiosis
alternation of generations
sporophyte
gametophyte
spore
megaspore
microspore
megagametophyte
microgametophyte
intragametophytic/intergametophytic selfing
gamete
zygote
embryo
sporophyll
sporangia
archegonia
antheridia
sorus
ovule
pollen
flower
double-fertilization
endosperm
seed
monoecy/dioecy
embryophyte
nonvascular plants
vascular plants
liverworts (Hepatophyta)
hornworts (Anthocerophyta)
mosses (Bryophyta)
lycopods (Lycophyta)
ferns (Pterophyta)
cycads (Cycadophyta)
ginkgo (Ginkgophyta)
conifer (Coniferophyta)
gnetophytes (Gnetophyta)
flowering plants (Anthophyta)