

### Review for Exam 3

Know the elements of theories about the nature of species and where they came from before Evolution was suggested: Essentialism, Special Creation, Catastrophism, Progressionism

Know what was already known about Evolution before Darwin proposed his theory; from comparative anatomy and geology

Know what ideas and experiences contributed to the development of Darwin's theory of ENS

Know the 2 major themes of Darwin's theory and the essential elements of required for evolution by natural selection

Know how ENS conflicts with previously held ideas about the nature of species and where they came from

Know how Darwin used each of the following as evidence for ENS; artificial selection, the fossil record, comparative anatomy, comparative embryology, biogeography.

Know what the Paradox of variation is and how the rediscovery of Mendel's work contributed to resolving it.

Be able to define gene pool, allele frequency, genotype frequency, phenotype frequency, gene fixation and genetic variation and know how they are related to each other.

Know what the Hardy-Weinberg theorem says and what conditions are required for a population to remain in HW equilibrium

Know the population genetics definition of evolution and how the HW theorem is useful in the study of evolution.

Know how each of the following affects gene and genotype frequencies in populations; genetic drift, mutation, gene flow, non-random mating, and natural selection.

Know the "story" of the peppered moth and the lesson it taught

Be able to define and know the relationships among natural selection, adaptation, and relative fitness.

Be able to define and distinguish directional, stabilizing, and diversifying selection and know how each is expected to affect the mean and variance of the phenotype distribution in a population.

Know what evidence we have that there is genetic variation in natural populations, and know the 2 historical views of how much genetic variation there is and what determines this.

Know how electrophoresis permits detection of genetic variation in natural populations and what the application of this technique has taught us

Be able to recognize and distinguish 4 genetic mechanisms and 2 general patterns of natural selection that promote the maintenance of genetic variation in natural populations

Know what a cline is, what mechanisms can cause clines, and how reciprocal transplant experiments can be used to determine what causes a cline.

Know the basis for the Morphological and Biological species concepts and the advantages and disadvantages of each for classifying organisms

Know what makes the Biological Species concept superior for the study of evolution.

Be able to describe and distinguish 4 prezygotic and 4 postzygotic mechanisms that reinforce reproductive isolation

Know the defining features of instantaneous speciation and the processes that cause it.

Know how hybridization followed by polyploidy can lead to speciation.

Know the defining features of and the processes and mechanisms that lead to gradual speciation

Be able to recognize and distinguish the defining features of allopatric and sympatric speciation and the conditions required for each to occur.

Be able to define and distinguish the geographic and peripheral isolates models of allopatric speciation

Be able to describe the difference between the pattern of evolution suggested by Gradual speciation and Punctuated Equilibrium and what evolutionary mechanisms each emphasizes.

Understand how systematists use phenotypic similarity among species to reconstruct evolutionary history, how convergent evolution presents a problem for this approach, and how using similarity of molecules (DNA sequences or amino acid sequences of proteins) is similar to and different from using morphological similarity to infer evolutionary history.

Be able to define Co-evolution and know how it is involved in the evolution of adaptations related to plant-pollinator interactions.

Know what a pollen vector is, what broad categories of vectors are used by plants, and the role of attractants and rewards in the evolution of flower diversity.

Know what a pollination syndrome is and why these evolve.

Know the definitions of each of the following:

Macromutation, co-evolution, analogy, homology, vestigial, phylogeny, bottleneck, founder effect, non-random mating, inbreeding, allozyme, genetic hitchhiking, heterozygote advantage, frequency dependent selection, phenotypic plasticity, binomial nomenclature.

Be able to do all of the problems on the Populations Genetic Problems worksheet.