**Bio 1 Exam 3 Study Guide**

Key words or terms from each lecture are new words introduced during the lecture that will likely be used in true or false, or multiple-choice questions. **Short answer free response questions will come from emboldened topics.** **Long answer free response questions will come from the emboldened and underlined topics**

**Chapter 11: Mendelian Genetics**

Know the difference between traits, genes and alleles. What are the characteristics that make something a model organism? Know the difference between an individual’s phenotype and genotype. What’s the difference between a dominant and recessive allele? When are dominant and recessive alleles expressed? Know the difference between homozygous and heterozygous genotypes, including homozygous dominant and homozygous recessive. What is the phenotypic ratio and genotypic ratio in a cross between two heterozygous individuals? Know how to use a punnet square. Mendel’s law of segregation. How many copies of each gene are within each gamete**? Be able to do a dihybrid cross and be able to provide the phenotypic ratio for the dihybrid cross (fill in).** What is the purpose of a test cross? Law of Independent Assortment. Incomplete dominance. Codominance. What are multiple alleles? What is polygenic inheritance? Difference between discrete traits and quantitative traits. How are quantitative traits distributed within a population? Bell curve.

**Key words and terms**: Genetic, heredity, trait, gene, allele, genotype, phenotype, dominant allele. Recessive allele, homozygous, heterozygous, monohybrid cross, dihybrid cross, Law of segregation, test cross, law of independent assortment, incomplete dominance, codominance, multiple alleles, polygenic inheritance, discrete traits, quantitative traits, normal distribution, bell curve

**Chapter 12: Units of Heredity**

What are X-linked disorders and how do the differ from autosomal disorders? **Be able to perform for X-linked crosses for recessive disorders (colorblindness), and be able to predict the chances of having a son or daughter with the recessive disorder**. What is the difference between linked traits and X-linked traits? What is the difference between an autosomal dominant disorder and an autosomal recessive disorder? What is a carrier? Know how to interpret a pedigree concerning a recessive disorder (cystic fibrosis). What is polyploidy and how is it different from aneuploidy? What is nondisjunction? What is the relationship between aneuploidy and cancer?

**Key words and terms:** Recessive disorder, autosomal recessive disorder, x-linked recessive disorders, linked traits, autosomal recessive disorder, autosomal dominant disorder, pedigree, polyploidy, aneuploidy

**Chapter 16: Intro to Evolution**

Know the difference between evolution (common descent with modification) and natural selection. **Be able to describe the difference between Lamark’s theory of evolution through acquired traits and Darwin’s theory of evolution by means of natural selection using giraffes as an example.** Who was Alfred Russel Wallace and what idea did he arrive at independently? **Know Darwin’s four postulates of natural selection**. Know the different types of evidence for evolution. What is a transitional form? What is the difference between analogous and homologous structures? What is convergent evolution? What were the selective pressures that influenced the evolution of the guppies in the different ponds in John Endler’s experiments?

**Key words and terms:** Common decent, natural selection, transitional forms, radiometric dating, morphology, homology, analogous structures, convergent evolution, vestigial traits, embryology,

**Chapter 17: Means of Evolution**

What is genetic diversity and why is it important? Know the difference between macroevolution and microevolution. What is a population? **What are the five mechanisms of microevolutionary change? Be able to briefly describe each mechanism and be sure to state whether it is random or non-random with respect to fitness**. What is the primary way that new alleles are created? If a mutation occurs in a somatic cell is it likely to be passed on to the next generation? Are most mutations beneficial or deleterious? What is gene flow? What is genetic drift and when is it most pronounced? When does the founder effect occur? What is a genetic bottleneck? How can the loss of alleles bad for populations? Know the definition of biological fitness. What is an adaptation? Know the definition of natural selection and how it differs from artificial selection. Is natural selection all about survival? What are selective pressures and how are they related to natural selection and adaptations? Know the different example of natural selection discussed in class including peppered moths, antibiotic resistance, disease resistance, Galapagos finches, and sickle cell anemia. What is coevolution and how is it different from convergent evolution? Know the examples of co-evolution including the cheetah and antelope, flower and pollinator, and newts and garter snake. What is sexual selection and what does it lead to? Sexual dimorphism. Do females always choose males with traits that are best for survival?

**Key words and terms**: Genetic diversity, adaptive potential, population, microevolution, macroevolution, mutation, deleterious mutation, geneflow, genetic drift, founder effect, genetic bottleneck, natural selection, biological fitness, adaptation, selective pressure, sexual selection, sexual dimorphism, coevolution

**Chapter 18: Outcomes of Evolution**

What is a species? Biological species concept. What is reproductive isolation and why is it important in the definition of species? Know the difference between macroevolution and microevolution. Given enough time can microevolutionary changes lead to macroevolution (speciation)? **Be able to describe the steps required for the evolution of a new species (speciation**). What are the two different types of speciation called? How does each type of speciation occur? What is allopatric speciation? Know the difference between vicariance and dispersal. Be able to provide an example of allopatric speciation (frogs, gnatcatchers, terns, salamanders, finches). **Be able to describe how the connection of the Panamanian isthmus led to the evolution of terrestrial and aquatic species.** What is adaptive radiation and when does it commonly occur? Know how plants and animals evolve through sympatric speciation? Ecological niche (fish in lake) or polyploidy (plants). How does sympatric speciation differ from allopatric speciation? What is an ecological niche? How do plants and animals evolve through sympatric speciation? Ecological niche (fish in lake) or polyploidy (plants). **What is an exaptation? Be able to provide an example of an exaptation. How do exaptaions differ from evolutionary novelties?** Is evolution goal oriented? Know the taxonomic order (Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species) and which groups are like to contain closely related species (Species in the same genus are likely more closely related than species in the same order). What is the purpose of a phylogeny? Difference between ancestral trait and a derived trait. What is a synapomorphy and how are they displayed on a phylogeny? Be able to interpret a phylogeny and locate the last common ancestor between two groups.

**Key words and terms**: Biological species concept, reproductive isolation, macroevolution, microevolution, allopatric speciation, adaptive radiation, sympatric speciation, ecological niche, polyploidy, exaptation

**Chapters 21-24: Diversity of Life**

Know when the age of the earth and when the first prokaryotes, eukaryotes, and animals appeared. Know the characteristics of animals. Know the different types of symmetry (asymmetry, radial symmetry, and bilateral symmetry) and which phyla have each kind of symmetry. Know the different types of digestion and which phyla have each type of digestion. Know the different types of skeletons and the phyla that have each type of skeleton. Know the different phyla that are segmented. **Know the two major groups of animals (protostomes and deuterostomes) and how each of them develops.** What is an invertebrate and what proportion of animals are invertebrates? Know the characteristics of sponges, cnidarians, flatworms, annelids, roundworms, molluscs, arthropods, echinoderms and chordates, concerning their development, symmetry, digestion, and skeleton, as well as the synapomorphies of each phyla (matching). What are collar cells? Osculum? What are the two life stages of cnidarians (polyp and medusa)? Synapomorphies of molluscs (radula, muscular foot, mantle). Which phyla grow continuously and which ones must molt to grow. Which phyla is most closely related to chordates? Know the characteristics of chordates (development, symmetry, digestion, and skeleton). What are the four synapomorphies of chordates? **Be able to provide the four adaptations that led to the success of terrestrial vertebrates and briefly describe how each adaptation was beneficial. Know when each adaptation evolved and be able to place the four synapomorphies in the correct position on a phylogeny**. Know the characteristics of amphibians, reptiles, birds and mammals, concerning the number of heart chambers and whether they are endothermic or ectothermic. What are the synapomorphies of mammals? Do all mammals give live birth.

**Key words and terms**: Collagen, asymmetry, radial symmetry, bilateral symmetry, intercellular digestion, gastrovascular cavity, alimentary canal, hydrostatic skeleton, exoskeleton, endoskeleton, segmentation, protostome, deuterostome, invertebrate, collar cells, osculum, cnidocytes, polyp, medusa, hermaphroditic, radula, muscular foot, radula, head, thorax, abdomen, dorsal hollow nerve cord, notochord, pharyngeal gill slits, post anal tail, jaws, lungs, limbs, amniotic egg,

**Bio Article** **#4: Fish Evolution**

**Describe the steps involved in the formation of a new species, then describe how the fish in the Lower Congo River likely evolved according to those steps.**