**Bio 2 Exam 1 Study Guide**

Fill in the blank answers will come from the key words or terms from each lecture. Words not used in fill in questions will likely be used in true or false, or multiple choice questions. **Short answer and short essay questions will come from emboldened topics.** **Long essay questions will come from the emboldened and underlined topics**

**Chapter 27 - Bacteria and Archaea**

**Know the following**: Structure of a prokaryotic cell including fimbriae and pili. The characteristics of prokaryotic and eukaryotic cells (table). Purpose and function of capsule and endospore. Asexual reproduction (binary fission). Processes of genetic recombination (transformation, transduction, conjugation). Different bacterial shapes. **The differences in the cell wall structure of gram + and gram – bacteria**. Steps in the gram staining process. Different oxygen and nutritional requirements of bacteria. Five major bacterial groups and the examples from each group. Which group consists of entirely intercellular parasites? The shape, stain, nutritional requirements, oxygen requirements, and diseases caused the bacteria examples discussed in lecture. Nitrogen fixation and the group that performs it. First prokaryotes. Different extremophile archaea. **Comparison of characteristics among the three domains of life (table)**. Know the different roles of prokaryotes on Earth. What is bioremediation?

**Key words or terms**: Capsule, endospore, fimbriae, pili, peptidoglycan, transformation, transduction, conjugation, binary fission, coccus, bacillus, helical, filamentous, heterocyst, Stromatolites, extremeophiles, thermophiles, halophiles, methanogens, Bioremediation

**Chapter 28 – Protists**

**Know the following**: Characteristic(s) that unite all protists. Processes by which organelles originated (autogenesis and endosymbiosis). Distinguishing characteristics of four protist supergroups and their respective clades. The diseases, famines, or environmental problems caused by the different protists. What is eutrophication? **Be able to describe how dead zones are formed?** What are zooxanthellae and what is their role in coral bleaching? Which protists have coenocytic and septate hyphae. The photosynthetic pigments or carotenoids found in the different protist clades. Reproduction in ciliates. Which protist clade is the sister clade to plants? to animals?

**Key words or terms**: autogenesis, endosymbiosis, mitosomes, hydrogenesomes, mixotrophs, kinetoplast, coenocytic hyphae, septate hyphae, silica, xanthophyll, fucoxanthin, phycoerythrin, alveoli, conjugation, plasmodium

**Chapter 19 – Viruses**

**Know the following**: Characteristics of viruses and the reasons viruses are descried as non-living. Structural components of viruses (capsid, capsomeres, viral envelope). Replicative cycles of viruses (lytic and lysogenic). **Replicative cycle of a Class V: ssRNA serves as a template for mRNA synthesis. Replicative cycle of a Class VI: ssRNA serves as a template for DNA synthesis (retrovirus)**. The examples of the different virus classes (Influenza, HIV, Ebola, Coronavirus, Hepatitis, Polio) and the means of infection for each of the virus examples. What disease did Jonas Salk discover a vaccine for? What are vaccines? **Explain how CRISPR works and how it is being used to in gene editing.**

**Key words or terms**: capsid, capsomeres, phage, prophage, reverse transcriptase, provirus, retrovirus

**Chapter 31 - Fungi**

**Know the following**: General characteristics of fungi, including hydrolytic enzymes and storage of excess sugar (glycogen). Characteristics of first fungi. Anatomy of fungi (coenocytic or septate hyphae, mycelium, chitin). Mycorrhizae. Importance of mycorrhizae in evolution of land plants. Steps and structures in the sexual reproduction of fungi and asexual structures of fungi. **Reproductive cycles of Zygomycete, Ascomycete and Basidiomycete fungi**. Sexual and asexual reproductive structures in the different fungi classes. Characteristics of the five major fungi classes including types of hyphae. What makes fungi imperfect? Groups (protists, bacteria, fungi) that form the symbiotic relationship in lichens and what each group provides in the relationship.

**Key words or terms**: Hydroltic enzymes, glycogen, coenocytic hyphae, septate hyphae, mycelium, chitin, haustoria. mycorrhizae, plasogamy, heterokaryon, karyogamy, zygosporangium, sporangia, conidia, conidiophore, asci, ascocarps, basidia, basidiocarps, soridia

**Chapters 24, 25 and 26 – Evolution and Phylogeny**

Know the following: Contributions of Linnaeus, Lamarck, and Wallace to the development of evolutionary thought. Who is considered the father of taxonomy? Biogeography? What were the two main themes of “The Origin of Species”. **Difference between Lamarck’s and Darwin’s view on evolution using giraffes as an example.** Know the different forms of evidence for evolution. **Darwin’s four postulates of natural selection**. Know the differences between microevolution, macroevolution, and speciation. Difference between homologous and analogous structures. What is convergent evolution? Know how to calculate the age of a fossil using radiometric dating. Why are microsatellites and mitochondrial DNA used in genetic analysis? Know the three possible outcomes of hybrid zones, and how the biological fitness of the different groups relates to the outcomes. **Know the three steps involved in the formation of a new species (allopatrically)? The differences between vicariance and dispersal. What is necessary for allopatric speciation to take place?** **Be able to describe how the land bridge between North and South America led to the vicariance and dispersal of different species.** Know the differences between allopatric and sympatric speciation and how new species arise sympatrically. What is adaptive radiation and when does it occur? How do new traits arise (novelties, exaptation, changes in development)? Function and importance of homeobox and hox genes and their role in evolutionary change. Gene expression. Allometric growth. Heterochrony. Paedeogenesis. Differences between anagenesis and cladogenesis. Differences between gradualism and punctured equilibrium. Are evolutionary trends goal oriented? Know the proper Taxonomic sequence (Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species). Ways of hypothesizing evolutionary relationships (synapomorpies, molecular data). Different processes used to determine DNA similarities between species (DNA-DNA hybridization, restriction maps, DNA sequencing). Why do we use mtDNA or rRNA? Molecular clocks. Know how to interpret phylogenetic trees (sister taxa, last common ancestor, monopyletic, paraphyletic, polyphyletic groupings). Ways phylogenies are constructed (maximum parsimony, cladistics). **Know how to construct a cladogram using a character table.**

**Key words or terms**: microevolution, macroevolution, speciation, homologous structures, analogous structures, convergent evolution, vestigial traits, embryology, allopatric speciation, vicariance, dispersal, sympatric speciation, ecological niche, polyploidy, adaptive radiation, exaptation, heterochrony, paedeogenesis, synapomorphy, phylogeny, monophyletic, paraphyletic, polyphyletic

Cladogram practice problem.

Construct the most parsimonious cladogram using the character table below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Taxa** | | | | | |
| **Characters** | Millipede | Body Louse | Beetle | Assassin Bug | Bee | Ant |
| Wings | 0 | 0 | 1 | 1 | 1 | 1 |
| 3 body regions | 0 | 1 | 1 | 1 | 1 | 1 |
| Social | 0 | 0 | 0 | 0 | 1 | 1 |
| Complete Metamorphosis | 0 | 0 | 1 | 0 | 1 | 1 |
| Mobile Head | 0 | 0 | 0 | 0 | 1 | 1 |
| Flattened Body | 0 | 1 | 0 | 0 | 0 | 0 |