

Study Guide for Comprehensive Portion of the Final Exam  
BIOL 1202 Spring 2015

Chapter 22

- Explain the mechanism for evolutionary change proposed by Darwin and Wallace (i.e., natural selection)
  - The unequal survival and reproduction of an organism due to environmental forces resulting in the preservation of favorable adaptations. “survival of the fittest”
  - Process “selects” from what is available in the gene pool, new characteristics are not created on demand.
  - Mechanism behind it: 1. Variability, 2. Heritability, 3. Differential reproductive success.
- Define evolution
  - Change over time of the genetic composition of a population
  - Descent of modern organisms with modification from preexisting organisms.
  - Accumulation of inherited characteristics that enhance organisms ability to survive in specific environments.

Chapter 23

- Explain the statement “It is the population, not the individual that evolves.”
  - This means that a single organism cannot evolve by itself. Natural selection is survival of the fittest, so the adaptations are relative to each other. And are passed down through generations.
- List the five conditions that must be met for a population to remain in Hardy-Weinberg equilibrium (see page 475)
  - 1. No mutations, 2. Large population, 3. No gene flow, 4. No natural selection, 5. Random mating
- Describe the significance of mutation in the generation of genetic variability
  - Mutations are the source of new alleles and genes.
- Explain the role of population size in genetic drift
  - if a population is small and there is a mutation that changes an allele then it would be dramatic due to the small size. If the population is big and here is a mutation resulting in different alleles then the genetic drift wouldn't be as dramatic and would take time to take effect.
- Distinguish among directional, disruptive, and stabilizing selection. (See Figure 23.13)
  - Directional: occurs when selection favors one extreme trait value over the other extreme.
  - Disruptive Selection occurs when selection favors the extreme trait values over the traits in the middle. In this case the variance increases as the population is divided into two distinct groups. Disruptive selection plays an important role in speciation.
  - Stabilizing Selection occurs when selection favors the intermediate trait value over the extreme values. Populations under this type of selection

typically experience a decrease in the amount of additive genetic variation for the trait under selection.

#### Chapter 24

- Distinguish between allopatric and sympatric speciation
  - Allopatric means “other country”, this speciation happens due to a geographic barrier of some sort
  - Sympatric speciation occurs in a geographically overlapping area
- List the reproductive barriers that may lead to speciation and identify whether they are a prezygotic or postzygotic barrier. Give examples of each. (See Figure 24.3)
  - Prezygotic barriers: impede mating between species or hinder the fertilization of ova if members of other species attempt to mate. Ex) the female of a frog species is much larger than a male of a different frog species so they are unable to mate successfully.
  - Postzygotic barriers: often prevents the hybrid zygote from developing into a viable, fertile adult. Ex) mules, a cross between a donkey and a horse, are sterile.

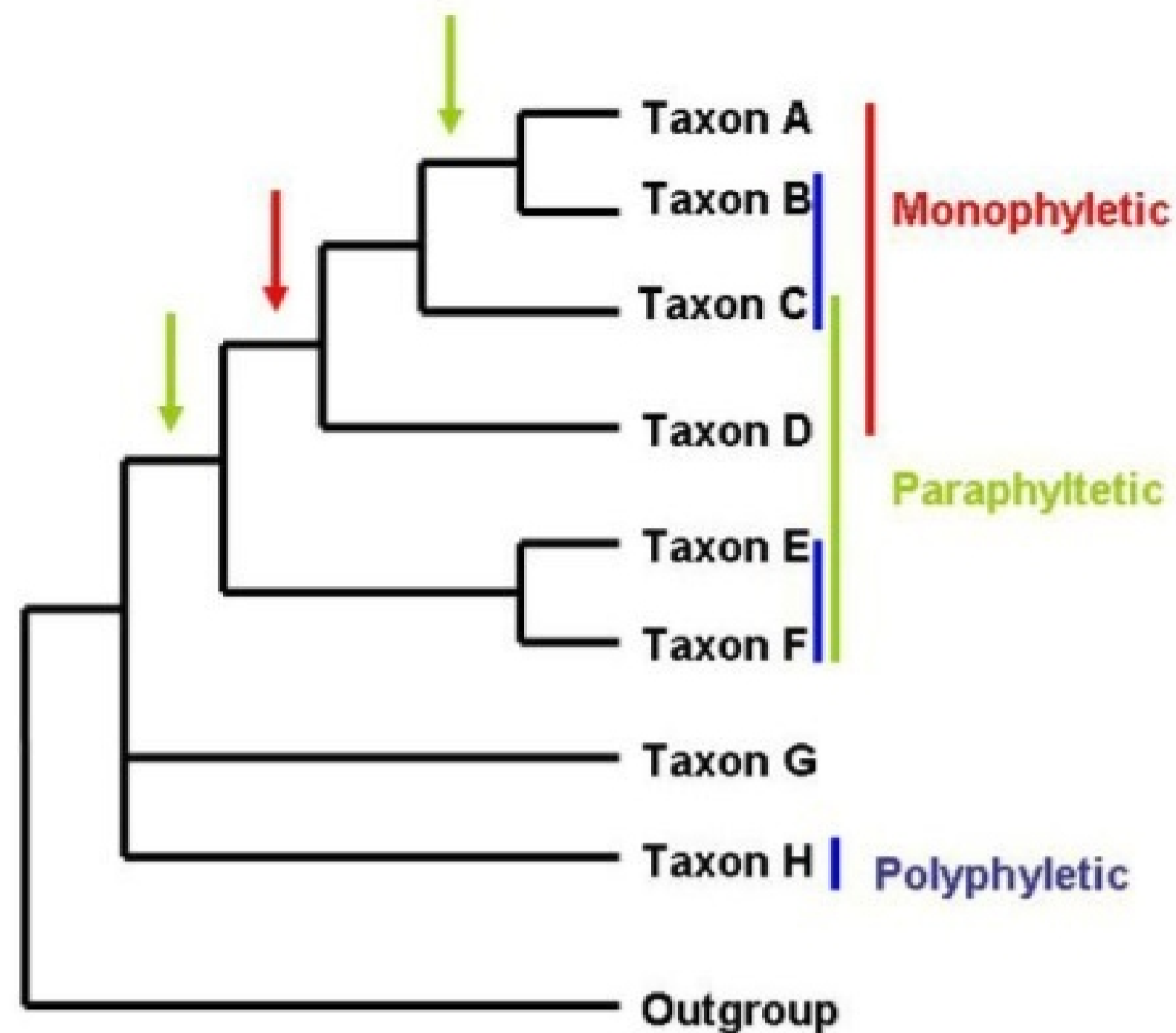
#### Chapter 25

- Explain the endosymbiotic theory for the evolution of the eukaryotic cell (see Figure 25.9)
  - eukaryotic cells evolved from prokaryotic through endosymbiosis.
  - Endosymbiont = a cell that lives in another cell (host)
  - Endosymbiosis Model = mitochondria and plastids (includes chloroplasts) were formerly small prokaryotes that began living in larger cells.
  - Evidence for Endosymbiosis; organelles share traits with prokaryotes
    - Inner membranes of both organelles have homologous enzymes & transport systems to those in plasma membranes of prokaryotes
    - Both organelles replicate by splitting like some prokaryotes
    - Single circular DNA in organelles & prokaryotes
    - Organelles have ribosomes and can transcribe & translate their DNA into proteins
    - Ribosomes in mitochondria & plastids more similar to prokaryotic than eukaryotic cytoplasmic ribosomes
- Describe the timing of key events in the evolution of the first prokaryotes through the evolution of humans (see Figure 25.7)

#### Chapter 26

- Identify the parts of and interpret a cladogram (see Figure 26.5)

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- Explain the hierarchical classification system and list the different levels of the system (see Figure 26.3)
  - How all organisms are classified.
  - They are broken down into Domain(most broad), kingdom, phylum, class, order, family, genus, species(most specific)

#### Chapter 27

- List the derived characteristics that distinguish prokaryotes from other life forms
  - Capsule – A sticky layer of polysaccharide or protein, may cover the cell wall of many prokaryotes.
  - Fimbria – Allow prokaryotes to stick to their substrates or other individuals in a colony
  - Sex Pilus – The filamentous projections (pili) on the surface of a bacterium that is important in conjugation.
  - Nucleoid – An irregularly shaped region within the cell of prokaryotes, which has nuclear material without a nuclear membrane and where the genetic material is localized.
  - Plasmid – Small circular DNA rings.
  - Flagellums – A tail-like projection that protrudes from the cell body of certain prokaryotic and eukaryotic cells, and functions in locomotion.