12/01/11

* Our Hero – Chuck!
  + Charles Darwin made a round-the-world sea
    - Studied and collected various insects and specimens in the Galapagos islands
    - Didn’t start finches until he was out in the middle of the ocean
    - Darwin observed similarities between living and fossil organisms and the diversity of life on the Galápagos Islands
  + Darwin reads two books on his voyage
    - Lyell’s “Principles of Geology”
      * Darwin realizes that still-operating natural forces gradually change Earth, and the gift of time!
    - Mathus’ “Essay on Human Populations”
      * Gives Darwin excess population and competition
  + After his return, Darwin began to document his observations and his new theory of evolution
    - Alfred Wallace conceived a theory almost identical to Darwin’s; both works were presented to the scientific community
    - Darwin’s “On the Origin of Species by Means of Natural Selection” was published in 1859
  + Darwin’s Mechanism
    - 2 observations
      * Overproduction
        + Populations have potential to produce more offspring than the environment can support
      * Individual variation
        + Individuals in a population vary in many heritable traits
  + From those observations a brilliant inference
    - Differential reproductive success
      * Those individuals with traits best suited to the local environment generally leave a larger share of surviving fertile offspring (fitness)
      * This is the definition of: Natural Selection
  + “Survival of the Fittest”
    - Put in there so the Catholic Church couldn’t use his ideas for religion
  + “Descent with modification”
    - All organisms are related through descent from a remote common ancestor
    - Descendants spread into diverse habitats over millions of years and acquired adaptations to their environments
    - The history of life resembles a tree with multiple branches from a common trunk
  + Natural Selection – Darwin, Wallace 1860’s
    - Individuals whose characteristics are best adapted to their environment are more likely to survive and reproduce
    - The unequal ability of individuals to survive and reproduce leads to a gradual change in the characteristics of a population over generations
  + What is required for evolution to occur?
    - Time!
    - Variation in population!
  + Variation and Natural Selection
    - Variation is extensive in most populations
      * Individual variation exists in all sexually reproducing populations
      * Heritable variation results from a combination of genes
  + Where does variety come from
    - Mutation and sexual recombination generate variation
      * Mutations changes alleles
      * Sex mixes genes
  + Mechanisms of Evolution
    - Evolution is defined as:
      * Change in allele Fx
      * In a given population
      * Over time
  + At least 4 ways we can document the changing of allele frequencies
    - Natural Selection
    - Nonrandom mating (a form of NS)
    - Genetic Drift
      * Founder effect
      * Bottleneck
    - Gene Flow
  + Natural Selection
    - Natural selection cannot fashion perfect organisms
      * Is not directional or goal driven
      * Can only edit what is available
  + Nonrandom Mating
    - Mates selecting for specific characteristics
    - Almost always the female
    - Behavioral, Physical, or Chemical