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