GL21A Palaeontology Lecture 3 & 4. Evolution and Natural Selection

Part 1. Evolution

- I. Pre-Darwinian Evolutionary Thought
 - A. Early Concepts of Species and Systematics
 - B. Changing Views in the 18th & 19th Centuries
 - C. Jean Baptiste Lamarck's Theory of Acquired Characteristics
- II. Charles Darwin and Natural Selection
 - A. 1831-1836 voyage of the H.M.S. Beagle.
 - i. Collected fossils in South America- recognized predecessors of modern mammals.
 - ii. Noted unique groups of organisms on isolated islands.
 - B. Read Charles Lyell Principles of Geology
 - C. Read Thomas Malthus's essay on population.
 - D. Interest in Animal breeding (Pigeon fancier)
 - E. A.R. Wallace.

III. Four basic tenets of Natural Selection

- A. Organisms produce more offspring than can survive.
- B. There is heritable variation in traits within populations of organisms.
- C. Competition for resources leads to a struggle for existence between organisms.
- D. Organisms with favourable traits are more likely to survive and reproduce.
- IV. What Natural Selection Isn't.....

Part 2. The Modern Synthesis

- I. Types of Variation
 - A. Non-Heritable (Ecophenotypic)
 - B. Heritable (Genetic)
- II. Sources of Genetic Variation
 - A. Cells, Chromosomes & DNA
 - 1. Cellular Reproduction (Mitosis and Meiosis)
 - 2. Genotype and Phenotype
 - C. Recombination and Crossing Over
 - D. Mutation

III. Defining Evolution

- A. The Modern Synthesis
 - 1. Non-adaptive Change (random drift, mutation, gene flow)
 - 2. Adaptive Change (from natural selection)
- B. Some 'isms'
 - 1. Reductionism
 - 2. Panselectionism
 - 3. Gradualism
- C. Questioning the Neo-Darwinian Consensus
 - 1. Genetics
 - 2. Palaeontological Problems

A Lamarckian Explanation



A Darwinian Explanation



(from Wicander & Monroe, 1993)