



Evolution: Notes

In this lesson...

- Early ideas about evolution
 - Theories of biological change
 - Theories of geological change
- Charles Darwin
 - Theories
 - Natural Selection
- Evidence of Common Ancestry
 - Analogous sources

Early ideas about evolution:

- **Theories of biological change**
 - Linnaeus
 - Classification system from kingdom to species
 - Buffon
 - Species shared ancestors rather than arising separately
 - Darwin
 - More complex forms developed from less complex forms
 - Lamarck
 - Environmental change leads to use or disuse of a structure
- **Theories of geological change**
 - Catastrophism
 - Volcanoes, floods, and earthquakes are examples of catastrophic events
 - Once believed responsible for mass extinctions and the formation of all landforms
 - Gradualism
 - Canyons carved by rivers show gradual change
 - The idea that changes on earth occurred by small steps over long periods of time
 - Uniformitarianism
 - Rock strata demonstrate this geological process
 - Still occur and add up over long periods of time to cause great change

Charles Darwin:

- **Observed variation among island species**
 - Species: Organisms so similar they can reproduce and produce fertile offspring
 - Mutations caused differences in physical traits in individuals and populations
 - Variation is a difference in a physical trait
 - Example: Galapagos tortoises have long necks and legs in contrast to regular tortoises
- **Realized species could adapt to their environment**
 - Species are able to adapt to their environment
 - Adaptation is a feature that allows an organism to better survive in its environment
 - Can lead to genetic change in a population
- **Observed fossil and geologic evidence of an ancient earth**
 - Fossils preserve traces of an organism from the past
 - Fossils are links between stages of evolution
- **Natural Selection**
 - A mechanism by which individuals that have inherited beneficial adaptations produce more offspring on average than other individuals
 - Four main principles of natural selection:
 - Variation
 - Overproduction
 - Adaptation
 - Descent with modification
- **Key insights that led to his theory**
 - Artificial selection
 - How humans use plant and animal breeds to develop phenotypic traits
 - Heritability
 - The ability of a trait to be passed down
 - Struggle for survival
 - Due to overpopulation and limited resources



Evidence of Common Ancestry:

- **Fossils**
 - Provides evidence of evolution
 - In older layers are more primitive than those in upper layers
- **Geography**
 - Provides evidence of evolution
 - Island species most closely resemble nearest mainland species
 - Populations can show variation from one island to another
- **Embryology**
 - Provides evidence of evolution
 - Identical larvae, different adult body forms
 - Similar embryos, diverse organisms
- **Anatomy**
 - Provides evidence of evolution
 - Homologous structures
 - Similar in structure but different in function
 - Vestigial structures
 - Remnants of organs or structures that had a function in an early ancestor
- **Analogous Structures**
 - Not evidence of a recent common ancestor
 - Have similar function to homologous structures