

SCIENCE 201 -- UNIT 2 -- THE DARWINIAN REVOLUTION

Outline for LECTURE 1 -- PRE-DARWINIAN PARADIGMS & DARWIN'S LIFE

- I. Overview of the Darwinian Revolution Unit**
 - A. Earlier paradigm--Fixity of Species (Creation/Essentialist)
 - B. Evolution--development of theory and examination of main ideas
 - C. Impacts of Darwinian Revolution (Changes in World View, Human Evolution, "Scientific" Creationism, Sociobiology, Evolutionary Medicine, Molecular Evolution)

- II. Introduction to today's lecture**
 - A. Introduction to evolution
 - B. Definition of the term theory
 - C. Paradigm shifts--Two components: 1) Scientific 2) Ideological
 - D. Assignment
 - E. Two major biological paradigms: 1) Fixity of Species 2) Evolution

- III. Influences on the Previous Paradigm -- FIXITY OF SPECIES**

(Creationist/Essentialist)

 - A. Greeks (Classical Tradition)
 - 1. Plato -- Theory of Forms (Eidos) = Essentialism or Typological Thinking
 - 2. Aristotle -- applied Theory of Forms to living world
 - Scala Naturae (scale of nature) = Great Chain of Being
 - = Ladder of Perfection

 - B. Christian Tradition -- Influenced by Greeks
 - Biblical account of creation/creator God
 - Species created and unchanged since then
 - Extinction not possible
 - Noah's flood as explanation of fossils
 - Limited time span for the Earth (Ussher - 6000 years)

 - C. Natural Theology -Approximately 1800-1850
 - Exemplified by Paley (Natural Theology); also Bridgewater Treatises
 - Much could be learned about God from the "Book of Nature"
 - "Argument from Design"

- IV. Problems for & Decline of the Previous Paradigm (Crisis in Kuhn's Terminology)**
 - A. Age of the Earth (Buffon, Hutton, Lyell)
 - B. Fossil Evidence (more and more fossils being found)
 - 1. Catastrophism required
 - 2. Extinction -- a problem for the Ladder of Perfection
 - C. Hybridization between species (e.g., Linnaeus)
 - D. New discoveries of huge number of plants and animals
 - E. Hierarchical arrangement of plants and animals (why maples, oaks, cats?)
 - F. Vestigial organs – organs with no apparent function --- all of these: EVIDENCE

- V. EVOLUTION -- The New Paradigm**
 - A. Buffon – brought evol. ideas to public attention; contributed to concept of very old earth
 - B. Lamarck – genuine concept of evolution; use & disuse; inheritance of acquired characters
 - C. Charles Darwin

VI. Situation at the time of Darwin

- Fixity of species still entrenched, but fraying
- world becoming viewed as increasingly old
- “Age of reason”; discoveries in physics, astronomy – hunt was on for the laws of nature (like the laws of physics) God becoming viewed as a “Watchmaker” God --- sets nature in motion and doesn’t constantly interfere --- not constant supernatural intervention

VII. Charles Robert Darwin

- A. Early Life
- B. Voyage of the Beagle
- C. Major Influences on Darwin during the Voyage
 1. Lyell's Principles of Geology
 2. Amazonian Rainforest
 3. Fossils near Punta Alta (giant extinct animals that resembled living species)
 4. Fossils at 12,000 feet in the Andes
 5. Earthquake at Concepcion and the rise in the level of the land
 6. Animal life on the Galapagos Islands
 - a. While distinct, resembled South American species
 - b. Slight differences between the animals from island to island
 - c. Geologically recent volcanic islands, yet many species
- D. Returned to England
 1. Thomas Malthus (clergyman) – An Essay on the Principle of Population
 2. Procrastination
 3. Wallace's letter
 4. Joint publication of papers -- 1858
 5. Origin of Species -- 1859
- E. Darwin's Contributions
 1. Overwhelming evidence for evolution
 2. Mechanism for evolution -- Natural Selection
- F. Influences on Darwin
 1. Concept of an immensely old earth; Buffon, Hutton, Lyell
 2. Observations and evidence from the Voyage and later research
 3. Natural Theology -- detailed study; emphasis on adaptation
 4. Malthus -- idea of rapid population growth and overpopulation
 5. Natural Laws -- Watchmaker God

VIII. Next Time

1. Explanation of Natural Selection: The Mechanism of Evolution
2. Evidence for Evolution
3. Summary of Darwin's Life