

CIVILIZATION SEQUENCE PROGRAM (CVSP 204)  
**DARWIN, DARWINISM AND EVOLUTION**

**I. CHARLES DARWIN (1809-1882)**

1831-1836: Voyage on HMS *The Beagle*

1858: Two manuscripts by Darwin and Wallace proposing the same concept of ‘natural selection’ presented at the meeting of the Linnaean Society of London.

1859: Publication of the first edition of “*On The Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*”.

Four principal postulates of Darwin’s theory were:

1. **Species Change:** the non-constancy of species; world is not static but evolving; living things, as reflected in the fossil record, change over time.
  - Concept dates back to ancient Greek philosopher Anaxiamander (611-547 B.C.) and the Roman philosopher Lucretius (99-55 B.C.), who had suggested that:
    - all living things were related
    - they had changed over time.
  - Supported by palaeontology: fossils (i.e. extinction and changes in organisms), despite gaps in the fossil record (“missing links”).
  - Challenged Christian Theology at that time (literal interpretation of the Bible; fixity of living things; immutability of the world; perfection of creatures, being God’s Creation; Earth is 4004 years old; fossils regarded as *lusus naturae* or “jokes of nature”.);
  - At odds with Platonic philosophy (essentialism, idealism, typology)
2. **Gradualism:** Process of evolution is gradual and continuous.
  - Discordant with **catastrophism**: Buffon, 1799 and Cuvier, early 1800’s: species went extinct as a result of repeated catastrophes.
  - Concordant with **uniformitarianism** concept in geology: the same processes are responsible for both past and present events:
    - Hutton, 1788 (Earth is very old, “No vestige of a beginning, no prospect of an end”).
    - Charles Lyell, 1830-33- *Principles of Geology*
3. The notion of **branching**: Similar organisms, where related, are descendants from common ancestors; all living organisms might be traced to a single origin of life.
  - rejects Aristotle’s *Scala naturae* and Teleology
4. **Natural selection** is the mechanism of evolution: a two step process:
  - First step: production of variation.
  - Second step: Selection through survival in the struggle for existence.
    - Concept first suggested by Greek philosopher, Empedocles (c.490-430 BC): life started as organs coming together forming organisms; Those adapted to “some purpose” survived; those that did not “perish and still perish”.
    - Agreed with Lamarckian evolution (1744-1829) in terms of adaptation and gradual change,
    - Refuted Lamarckian evolution as a goal-oriented process, the principle of use and disuse and inheritance of acquired characteristics.
    - Influenced by Thomas Malthus 1798: *An Essay on the Principle of Population*, (as populations increase, their resources become scarcer and that leads to shortages of food, famine, diseases, war etc)
    - Influenced by **artificial selection** practices.
  - Evidence for Darwinian evolution comes from: systematics (= classification), comparative anatomy, embryology (= development), biogeography (=geographical distribution of organisms), palaeontology (= study of fossils), rudimentary genetics, studies of ecology and behavior, artificial selection.

## II. AFTER DARWIN

- Early 1900's: Mendelian Genetics, The science which plugs a hole in Darwin's theory.
- 1930's and 40's: Dobzhansky, Huxley, Rensch, Simpson, Mayr and Stebbins): Neo-Darwinism, the "new synthesis" or Synthetic Theory of evolution.
- The impact of Evolution:
  - "There are no living sciences, human attitudes or institutional powers that remain unaffected by the ideas that were catalytically released by Darwin's work" (Collins 1959).
  - "no biologist has been responsible for more .... drastic modifications of the average person's worldview than Charles Darwin" (Mayr 2000).
  - Evolution: the organizing principle of biology. "Nothing in Biology makes sense except in the light of evolution." (Dobzhansky 1973)

## III. MODERN (DARWINIAN) ZEITGEIST (Mayr 2000)

- 1) Rejecting all supernatural phenomena and causation.
  - Conflicts with prevailing beliefs and faith: uneasy relationship with religious establishments; attacks from "creationist science" and theories of 'intelligent design' etc.
- 2) Refuting typology with its emphasis on invariance and stability.
  - Introducing the new "population thinking" emphasizing variability and changeability.
- 3) Refuting teleology with its assertion of a "teleological force" driving towards ever greater perfection. (Aristotle's "final cause")
- 4) Refuting determinism; accepting the universality of randomness and chance.
- 5) A new view of humanity.
  - Anthropocentrism not reduced but enhanced (Man is indeed unique)
    - Human Evolution: biological and cultural.
- 6) Providing a scientific foundation for ethics.
  - Evolution and ethics : human cooperative and altruistic behaviors favored by natural selection, enhancing group survival; Selfishness implied in "social Darwinism" is not favored by natural selection.
  - Cooperation and altruism demonstrated in various animals

## References/Suggested Readings

- Collins, J, 1959 - Darwin's impact on philosophy. *Thought*. **34**:186-248.
- Desmond, A. and J. Moore, 1992 – *Darwin*. Penguin Books, London.
- Dobzhansky, 1973 -Nothing in biology makes sense except in the light of evolution. *American Biology Teacher* **35**:125-129.
- Mayer, W.V. 1984 - The arrogance of ignorance: Ignoring the ubiquitous. *American Zoologist* **24**:423-431.
- Mayr, E. 2000 – Darwin's Influence on Modern thought. *Scientific American* 283:79-83.
- Moore, J.A. 1984 - Science as a way of knowing: Evolutionary biology. *American Zoologist* **24**:467-534.
- Rennie, John, 2002 - 15 Answers to Creationist Nonsense. *Scientific American*, July 2002: 78-81.
- University of Cambridge, 2002-2007-, *The Complete Work of Charles Darwin Online*. <http://darwin-online.org.uk>