

*Descent with Modification:
A Darwinian
View of Life*

Ch 22

AP Biology
Mrs. King

Cassowary at Brevard Zoo
Photo by Mrs. King 2003.



Historical Context-Why Resisted

- Resistance in Western culture-Why?
- *Essentialism*-influence of Greeks, Plato and Aristotle
- Role of Linnaeus-order in diversity *ad majorem Dei gloriam, Deus creavit, Linnaeus disposuit*
- Cuvier-founded the study of fossils, opponent to evolution
- *Catastrophism*-major changes in Earth's crust the result of local floods, earthquakes, not gradual processes

Fossil Record



Vertebrates

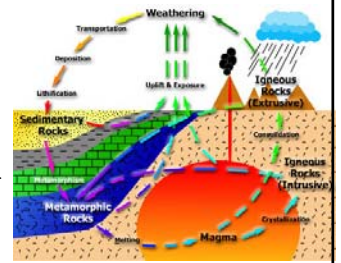


Invertebrates

- Preservation and bias in the fossil record
<http://www-geology.ucdavis.edu/~GEL3/biases.html>
- Fossils are found in sedimentary rock

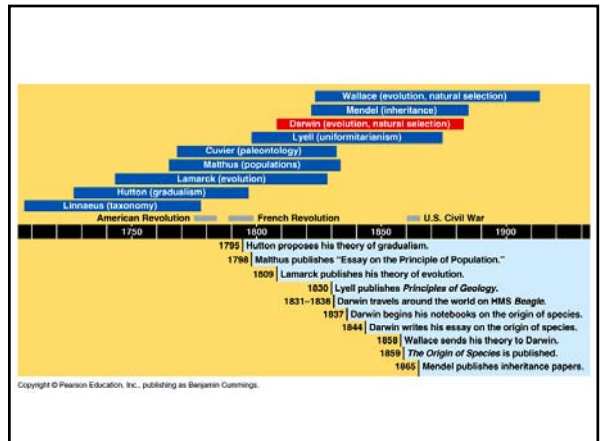
How Fossils Form

- Found in sedimentary rock
- Formed when exposure to the elements break down rocks into small particles
- Sediments pile up year after year, compressing the layers, and preserving the dead organism by turning it into rock.



Gradualism

- geographic change due to slow, continuous processes
- Proposed by Hutton
- Charles Lyell expanded gradualism to uniformitarianism
- geological processes are constant from the beginning to present



Diversity of Life

- Fitness: to Survive and Reproduce
- Successful **adaptations** enable organisms to become better suited to their environment.

The Origin of Species

- Descent with modification
- Natural selection and adaptation: three inferences and five observations, p. 435
- Variations exist, environment changes, selection occurs, adaptations result
- Malthusian influence

Evidence of Evolution

- Biogeography-geographical distribution of species
- Fossil record
- Comparative anatomy-significance of homologous structures and vestigial organs
- Comparative embryology-*ontogeny recapitulates phylogeny?*
- Molecular biology

Natural Selection

- Multi-drug resistant TB (6 min video clip)
<http://www.teachersdomain.org/9-12/sci/life/evo/whymatters/index.html>
- Bird Beaks (4 min video clip)
<http://www.teachersdomain.org/9-12/sci/life/evo/hummingbird/index.html>
- Camouflage (1 min video clip)
<http://www.teachersdomain.org/9-12/sci/life/evo/camouflage/index.html>

Units of Variation

- Genes carry heritable characteristics, also source of random variation
 - *crossing over*
- Mutations cause variation
 - *missing letters in DNA*

Evidence of Evolution

Table 22.1 Molecular Data and the Evolutionary Relationships of Vertebrates

Species	Number of Amino Acids That Differ from a Human Hemoglobin Polypeptide (Total Chain Length = 146 Amino Acids)
Human	0
Rhesus monkey	8
Mouse	27
Chicken	45
Frog	67
Lamprey	125



Darwin- “just a theory”

- Darwin made two claims:
 - 1) modern species evolved from ancestral forms
 - 2) the mechanism for evolution is natural selection
- Theories: conceptual frameworks with great explanatory power used to interpret facts, do not become dogma
- **theory** of evolution and **fact** of evolution