Darwin: idea of evolutions
  - Mechanism: naturals selection

Carolus Linnaeus (1707 – 1778)
  - Species created through hybridization as part of gods plan

Immanuel Kant
  - Similar species could have similar ancestors

Erasumus Darwin (Darwin’s grandpa)
  - As we use and disuse body parts they evolve/disappear
    - This leads to sexual selection

Path of Darwin
  - Thomas Malthus
    - Organisms produce more offspring than can survive
    - His book lead to the idea of natural selection
      - Poverty + famine = overpopulation

Darwin and Wallace
  - Darwin: meticulous observer
    - First to understand formation of coral reefs
    - Idea of natural selection
      - Held up for 20 years
    - Wallace matched idea
    - Wallace and Darwin presented idea together... Wallace eventually dropped.

Basic Idea
  - All populations have heritable variations: height, speed, color...
    - Some better for survival and give sexual advantage

  - Critics: origin of mutation
    - DNA / Genes (not discovered)

Gregor Mendel
  - discovered DNA
  - Genes: section of hereditary that codes for a characteristics, section of a single chromosomes.
  - Alleles: alternative forms of each gene.

20th Century
  - Discovery of nucleus
  - Chromosomes coiled in strands of DNA
    - Chromosomes come in pairs
DNA
- Backbone of sugar and phosphate
- Connected by 4 bases
- Mutation only occurs in sex cells
- Mutations are random
- Species arise from separation of populations

Changes
- occur over time, not fast
- convergent changes: development of similar characteristics in distantly related organisms

Why do geologists care about biology?
- Fossils help us determine the age of rocks
- Fossils provide clues to Paleoenvironments
- Relative age: qualitative age, based on events
- Absolute age: quantitative age: based on date

Development of Geology
- Leonardo Di Vinci
  - Sediments go to rivers, then to oceans, then form sedimentary rock, then get uplifted and form mountains.
  - Agreed with Aristotle: fossils are signs of ancient life.

How old is the earth?
- Biblical est.: 6-7 thousand year
- James Ussher: 4004BC

6 fundamental principles of relative dating
- 1: Superposition: in an undisturbed sequence of rock layers... the bottom is the oldest, the top is the youngest.
- 2: Original Horizontality: In a sequence of rocks, layers are deposited as flat horizontal layers.
- 3: Lateral continuity: sedimentary layers extend sideways in all directions until they ready a depositional basin (barrier that stops extension)