

## **Descent with Modification: A Darwin View of Life**

The first “convincing” case of evolution was published by Charles Darwin in 1859

### **Evolution is the transformation of life forms on earth over time**

- Descent with modification
- Evolution is change over time
  - A change in the frequency of the alleles of a population
    - Mutation which favors one allele over another
    - Mutation which creates a new allele that is favored
  - Change over a time period of generations
    - For bacteria: a day or two
    - For humans: maybe 200-300 years
  - Evidence of evolution
    - Changes in phenotypes
    - Look at the DNA(genotype)
      - This is the fastest way

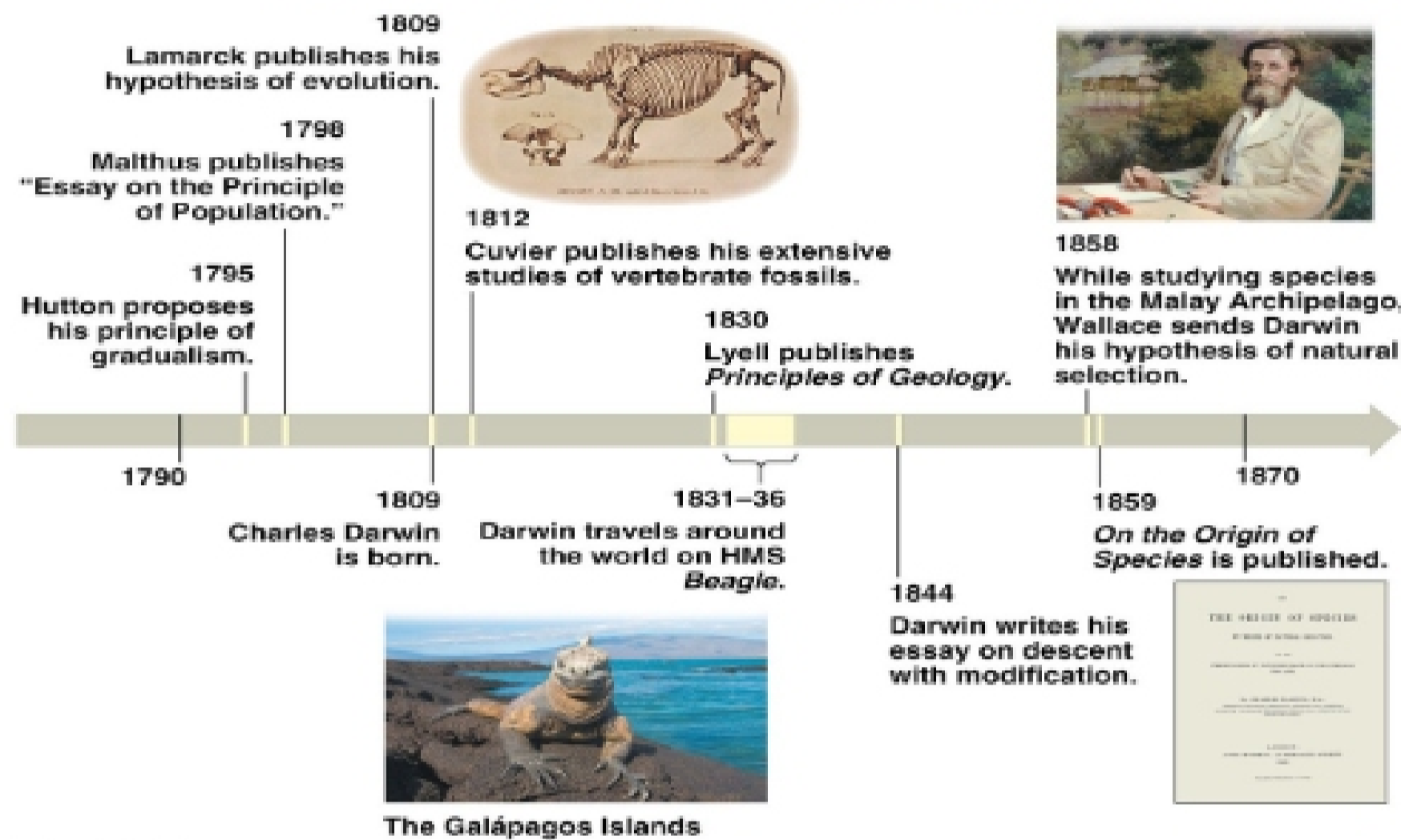
Darwin's Ideas Were Opposed by Western Philosophy

- **Creationism**
  - **All species were created exactly as they exist today**
  - Most popular hypothesis
  - European Culture

- o Could be either strictly biblical or involve continual creation

## Fossils and a Record of Change

- Fossils are preserved remnants or impressions of an organism or something related to an organism that lived in the past
  - o A succession of organisms is seen in the fossil record
  - o The differences between fossils and living species are profound
    - These results were not used to support evolution



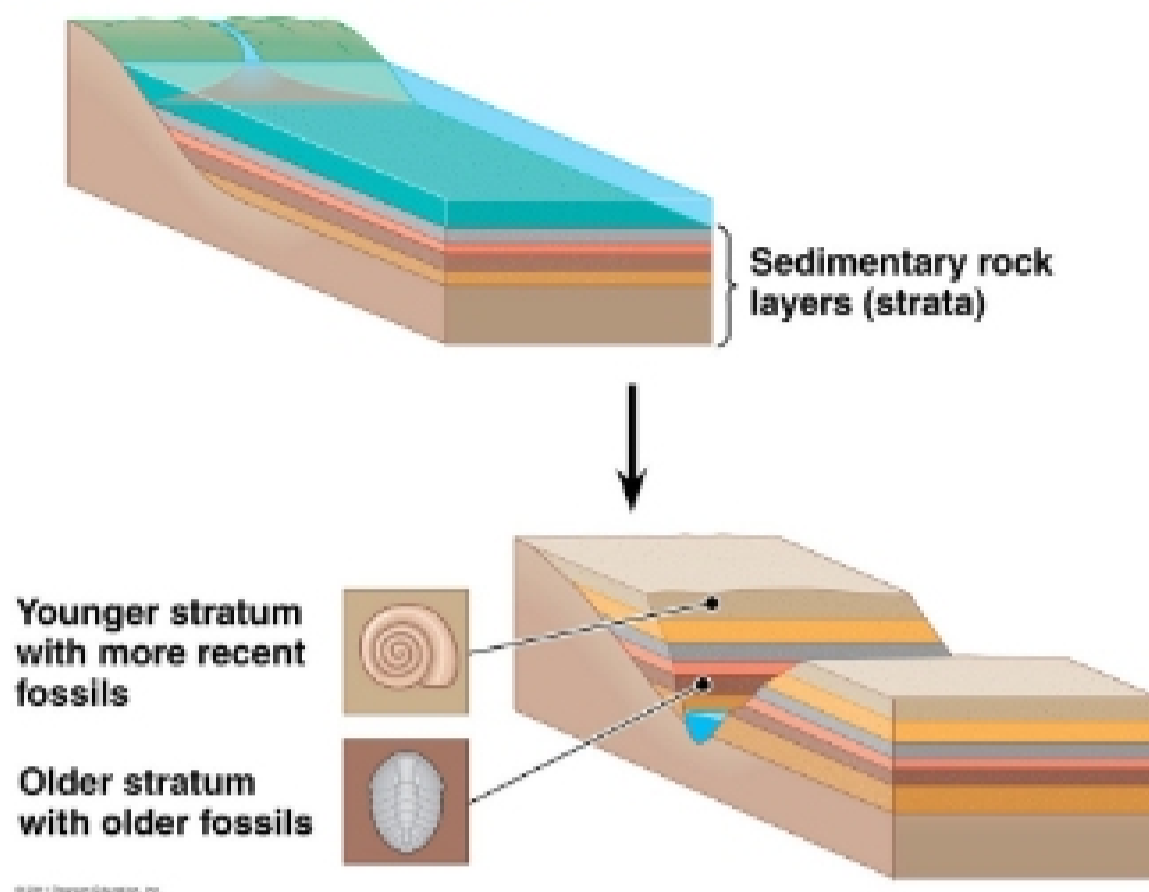
- **Catastrophism**

- o **A theory, which states that the major changes in the earth's crust are the result of catastrophic events rather than gradual process of change**
- o A French anatomist, Georges Cuvier, founded the Science of Paleontology in the late 1700s
  - **The study of fossils**
- o Cuvier explained the layers of different species were caused by separate catastrophic events

## Geological Gradualism: The predecessor of evolution

- In the late 1700's a, Hutton, proposed that the large changes seen in the fossil records were the result of **uniformitarianism**.
  - o **The principle that profound change is the cumulative product of slow, continuous process.**

- o This was the first indication that the changes seen on earth were usually slow



- o If the changes were slow, then the theological timeline of 6000 years must be in error
  - Championed by Hutton and Curvier

#### Pre-Darwinian Theory of Evolution

- Lamarck placed fossils in an evolutionary context
- Lamarck compared modern species to the fossil record and identified several line of descent consisting of a succession of:
  - o Older fossils → younger fossils → modern species
    - in 1809 Lamarck's comprehension model was published
- Lamarck envisioned many "ladders" of evolution, which organisms could "climb"
  - o The least complex organisms at the bottom of the ladders were spontaneously generated.
  - o The complexity of organisms increased in a "march toward perfection" and the most complex organisms were at the top of the ladder
- The mechanism of change involved two principles:
  - o Use and disuse
    - Use it or lose it philosophy
- Acquired traits can be passed along to the next generation