

# AP BIOLOGY | Natural Selection & Evolution

## 15.1 History of Evolutionary Thought

1. In 1831, \_\_\_\_\_, a 22-year-old naturalist, accepted a position aboard the ship HMS *Beagle* that began a voyage around the world
2. The pre-Darwinian world-view was different from the post-Darwinian.
  - a. Pre-Darwinian world-view was determined by intractable \_\_\_\_\_ beliefs.
    - 1) The earth is young.
    - 2) Each species was specially created and did not change over time.
    - 3) Variations are imperfections varying from a perfectly-adapted creation.
    - 4) Observations are to substantiate the prevailing worldview.
  - b. Darwin, however, lived during a time of great change in scientific and social realms.
  - c. Darwin's ideas were part of a larger change in thought already underway among biologists; this concept would eventually be known as \_\_\_\_\_.

### A. Mid-Eighteenth-Century Contributions

1. Taxonomy
  - a. \_\_\_\_\_ is the science of classifying organisms
  - b. \_\_\_\_\_ (1707–1778)
    - 1) developed a binomial system of nomenclature (two-part names for each species [e.g., *Homo sapiens*]).
    - 2) developed a system of classification for all known plants.
    - 3) Like other taxonomists of his time, believed in the ideas of
      - a) *Special creation*—each species had an “ideal” structure and function; and
      - b) *Fixity of species*—each species had a place in the *scala naturae*, a sequential ladder of life.
  - c. thought that classification should describe the fixed features of

species and reveal God's divine plan.

- d. His ideas reflected the ideas of Plato and Aristotle: the ideal form can be deduced, and organisms can be arranged in order of increasing complexity.
- e. His later work with hybridization suggested species might change with time.

2. \_\_\_\_\_

- a. known by his title, Count Buffon (1707–1788), was a French naturalist.
- b. He wrote a 44-volume natural history of all known plants and animals.
- c. He also provided evidence of \_\_\_\_\_
- d. His writings speculated on influences of the environment, migration, geographical isolation, and the struggle for existence.
- e. vacillated on whether he believed in evolutionary descent and he professed to believe in special creation and the fixity of species.

3. \_\_\_\_\_

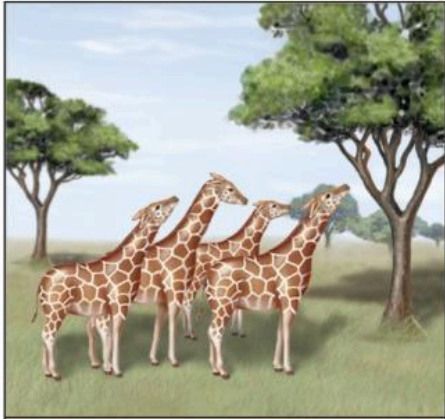
- a. (1731–1802) was Charles Darwin's grandfather.
- b. He was a physician and a naturalist whose writings on both botany and zoology contained many comments that suggested the possibility of common descent.
- c. He based his conclusions on:
  - 1) Changes undergone by animals during development,
  - 2) \_\_\_\_\_ by humans, and
  - 3) The presence of \_\_\_\_\_ (structures or organs that are believed to have been functional in an ancestor but are reduced and nonfunctional in a descendant).
- d. Erasmus Darwin offered no mechanism by which evolutionary descent might occur.

## B. Late Eighteenth/Early-Nineteenth Century Influences

1. \_\_\_\_\_ (1769–1832), a French vertebrate zoologist, was the first to use comparative anatomy to develop a system of classifying animals.
  - a. He founded the science of \_\_\_\_\_—the study of fossils—and suggested that a single fossil bone was all he needed to deduce the entire anatomy of an animal.
  - b. To explain the fossil record, proposed that a whole series of catastrophes (extinctions) and repopulations from other regions had occurred.
  - c. was also a staunch advocate of special creation and fixity of species; this presented him with a problem when geological evidence of a particular region showed a succession of life forms in the Earth's strata.
  - d. \_\_\_\_\_ is the term applied to Cuvier's explanation of fossil history: the belief that catastrophic extinctions occurred, after which repopulation of surviving species occurred, giving an appearance of change through time.
2. \_\_\_\_\_ (1744–1829) was the first to state that descent with modification occurs and that organisms become adapted to their environments.
  - a. an invertebrate zoologist, held ideas at odds with Cuvier's.
  - b. mistakenly saw “a desire for perfection” as inherent in all living things.
  - c. \_\_\_\_\_; belief that organisms become adapted to their environment during their lifetime and pass these adaptations to their offspring.
  - d. Experiments fail to uphold inheritance of acquired characteristics; the molecular mechanism of inheritance shows phenotypic changes do not result in genetic changes that can be passed on to the next generation.

3. \_\_\_\_\_ (1726-1797) concluded that extreme geological changes can be accounted for by slow, natural processes.
4. In his book *Principles of Geology*, \_\_\_\_\_ (1797-1875) presented arguments to support a theory of geological change proposed by J. Hutton.
  - a. In contrast to catastrophists, proposed that Earth was subject to slow but continuous geological processes (e.g., erosion and uplifting) that occur at a uniform rate, a theory called \_\_\_\_\_.
5. \_\_\_\_\_ (1766-1834), an economist, published *An Essay on the Principle of Population* (1798).
  - a. He proposed that the size of human population was limited by the quantity of resources available.
  - b. Famine, war, and epidemics are a result of overpopulation and limited resources.
  - c. Darwin used Malthus's principle to formulate his idea of natural selection.

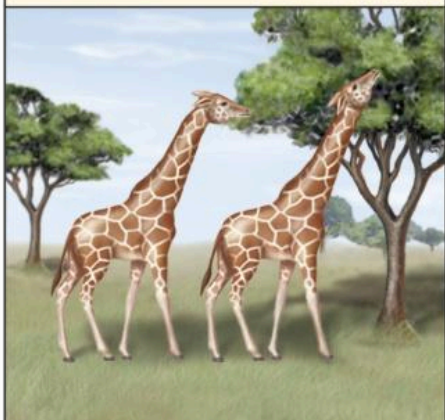
# Darwin's Explanation for Giraffe Long Neck



Early giraffes probably had necks of various lengths.

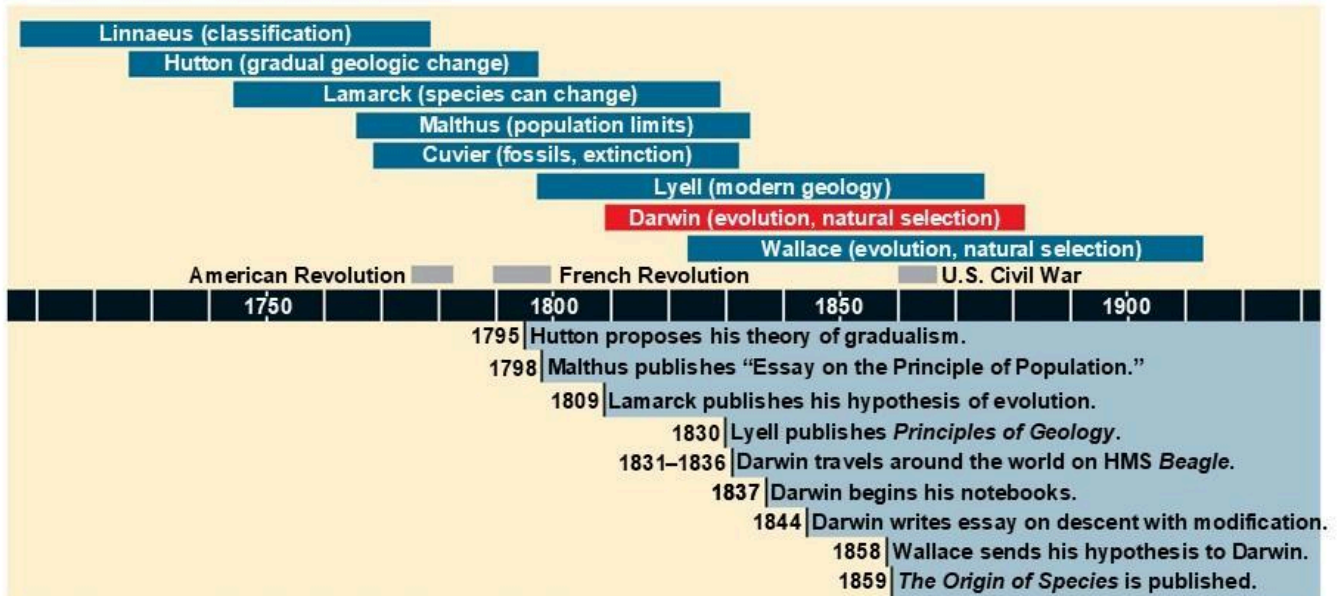


Natural selection due to competition led to survival of the longer-necked giraffes and their offspring.



Eventually, only long-necked giraffes survived the competition.

# Intellectuals / Ideas in Darwin's Era



## Fossils

