

# Evolution of an Idea Theories

# Evolution of an idea

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## ◉ Think-Pair-Share Activity

- Why do giraffes have longer necks than other animals?
- Why are fossils found for animals that no longer exist?
- What is the source of genetic variation?

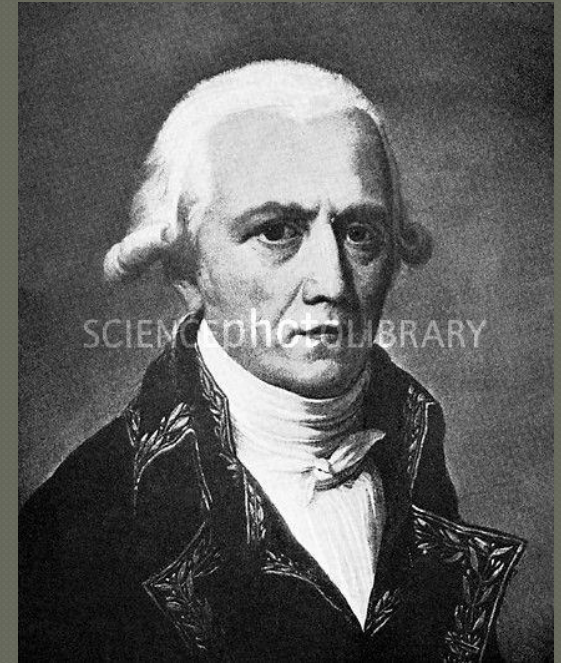
# Carl Linnaeus – 1707 - 1778

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- Recall: the current system of binomial nomenclature is based on work from Carl Linnaeus
- He was also one of the first biologists to question the idea of fixed species. He theorized that new species could arise through different mechanisms

# Jean-Baptiste Lamarck 1744 - 1829

- First scientist to offer a possible mechanism for the evolution of species
- He proposed two principles for the mechanisms of evolution
- He believed these principles could explain why species were well adapted to their environments



# Lamarck's first principle

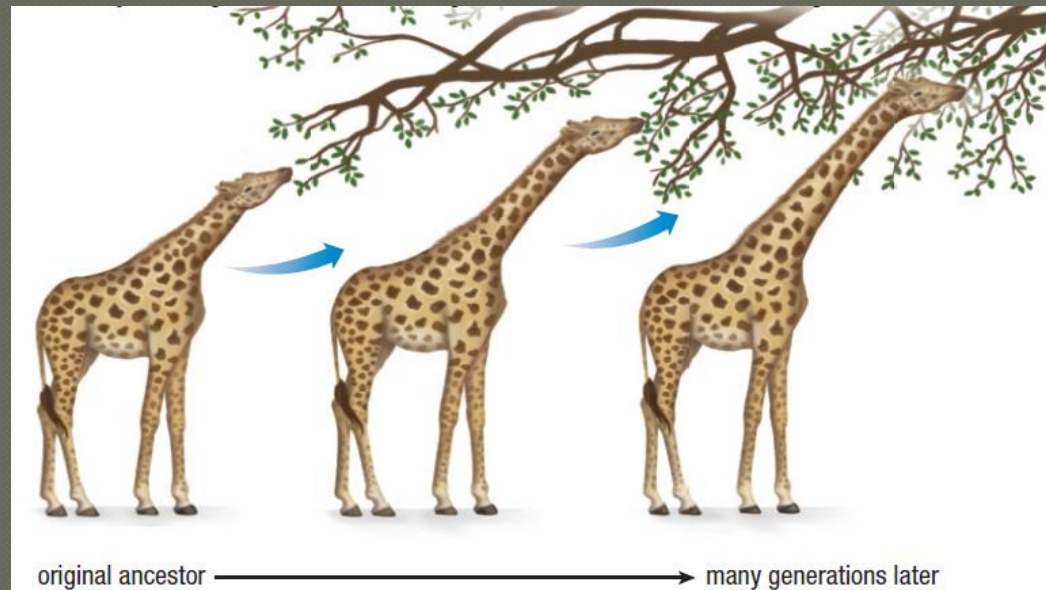
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- Use and disuse
  - Used structures become larger and stronger while unused structures became smaller and weaker when not used
  - For example: Muscles



# Lamarck's second principle

- The inheritance of acquired characteristics
  - Organisms can pass on gained characteristics to their offspring.
  - E.g. Giraffe's neck



# Flaws in his theory

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- Organisms can acquire characteristics throughout their lifetime but not all characteristics can be changed through use and disuse
  - Eyes don't get stronger and bigger
- ◉ Characteristics that can be changed are generally not heritable.
  - **Not possible to pass on stretched muscles in neck through DNA**

# Contributions to current theory

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- All species evolve over time
- A species evolves in response to its environment and becomes better adapted to that environment
- Changes are passed on from generation to generation

These contributions stimulated lots of scientific discussion that set the stage for the theory of evolution.



# Fossil

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- Any ancient remains, impressions, or traces of an organism or traces of its activity that have been preserved in rocks or other mineral deposits.
- Read formation of fossils (textbook pg. 290)

# Georges Cuvier 1769 - 1832

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- Famous palaeontologist who studied fossils and observed the following:
  - Fossils of very simple organisms are found in all depths of fossil deposits
  - Fossils of more complex organisms are found only at shallower depths, in younger rock
  - Fossils in the shallower depths are more likely to resemble living species
  - Rock layers contain fossils of many species that do not occur in layers above or below them



- These observations showed a pattern of change: supporting the theory that life had evolved from simple to more complex forms over time.

# Cuvier's Catastrophism

- His proposed theory of catastrophism:
  - Global catastrophes could lead to widespread extinction of species
    - E.g. floods, droughts
  - Extinct species were then replaced by a new set of species
    - Extinct species are fossilized in a layer that correlates with the catastrophe

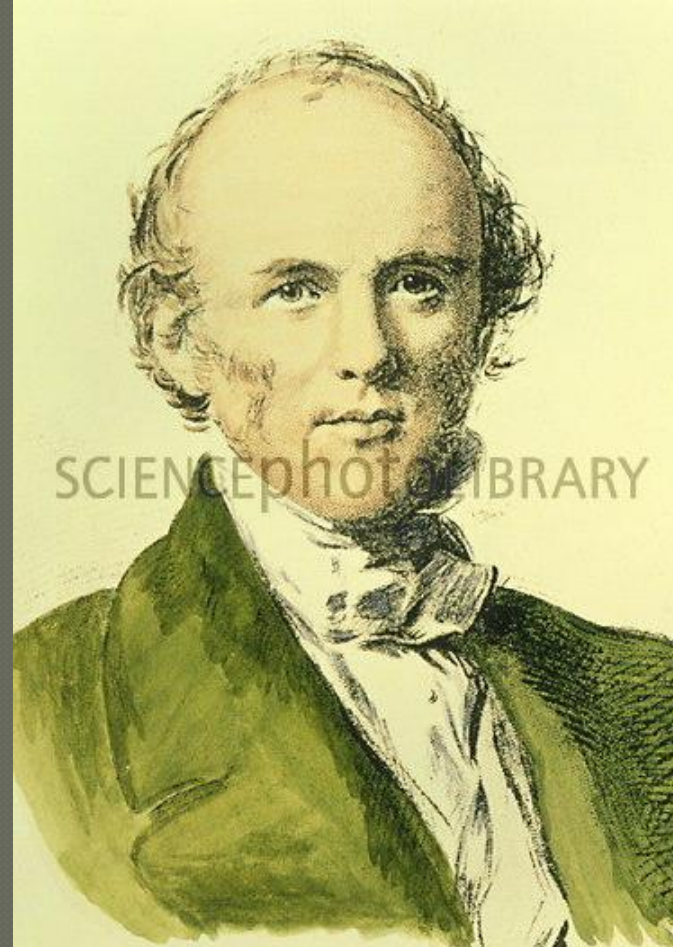
# Flaws in his theory

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- His theory accounted for the different groups of species in each layer BUT it did not adequately account for why each layer included progressively more complex forms

# Charles Lyell 1797 - 1875

- Studied rocks and fossils, and is considered the father of modern geology
- His ideas were considered radical because they suggested that Earth was much older than the widely accepted idea that Earth was relatively young.



# Uniformitarianism

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- His principles of Uniformitarianism (from his book, *Principles of Geology*):
  - Earth has been changed by the same processes in the past that are occurring in the present
  - Geological change is slow and gradual rather than fast and catastrophic
  - Natural laws that influence these changes are constant and eternal, and they operated in the past with the same intensity as they do today

# Natural examples

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- For example: Mountain ranges might have formed by extremely slow processes, and that deep gorges were the product of slow erosion

