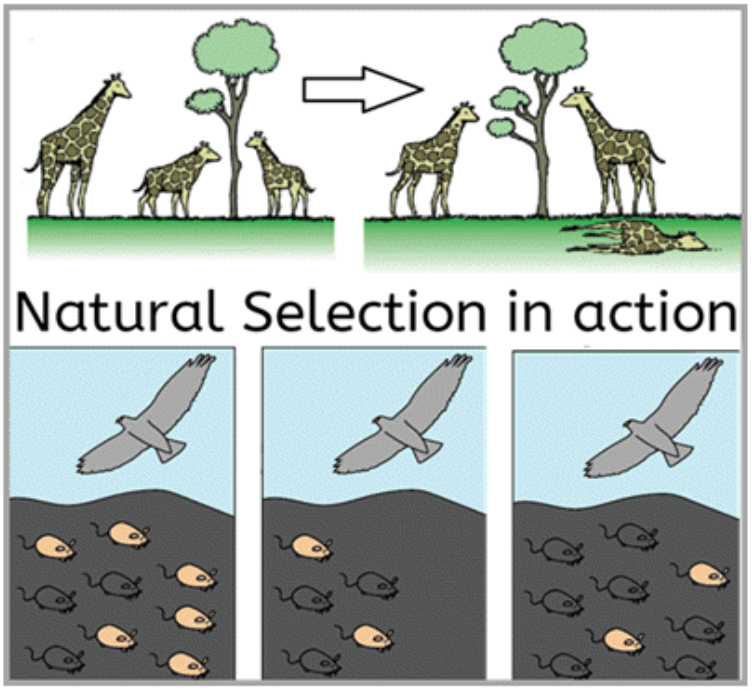
a. MUTATION, ADAPTATION, NATURAL SELECTION, AND EXTINCTION CHANGE POPULATIONS;

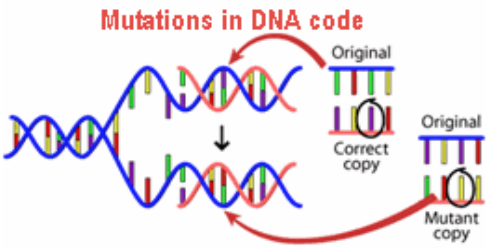
b. THE FOSSIL RECORD, GENETIC INFORMATION, AND ANATOMICAL COMPARISONS PROVIDE EVIDENCE FOR EVOLUTION

c. ENVIRONMENTAL FACTORS AND GENETIC VARIATION, INFLUENCE SURVIVABILITY AND DIVERSITY OF ORGANISMS

Mutation, Adaptation, Natural Selection, and Extinction change populations

- Species **respond** to changes in their environment through **adaptation**, which is a **gradual process** that occurs over a long period of time.
- The progression of these **long-term changes** is well documented in the **fossil record.**
- The **genetic variation** in a population will remain **stable** from one generation to the next in the absence of **disturbing factors** (changes) such as **mutations** and **natural selection.**
- As **habitats change**, some organisms **survive** and **reproduce**, **some move** out of or into the **transformed habitat**, and **some die.**
- A **change** in the sequence of **DNA** (and thus the **protein** produced) can have a **positive**, **negative**, or **no** effect on an organism.



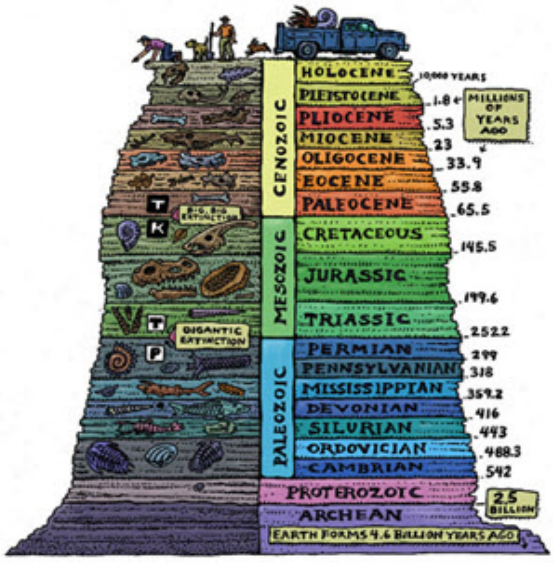


- **Mutations** can be caused by **random errors** during DNA replication, exposure to **radiation**, or **chemicals.**
- Whereas **mutations** in the **body cells** of an organism **won't be passed** on to its offspring, mutations in the **sex cells** of an organism will be passed on to its **offspring** .
- The interaction of **heredity** mechanisms and the **environment** creates both **stability** from one generation to the next and drives change that produces the **diversity** of life on our planet.

- **Natural selection** describes the survival and reproduction of individuals within a population exhibiting variations for **traits** that **best enable them to survive** in their environment.
- The **frequency of certain traits** in a species can **shift** over time in response to natural and artificial selection.
- This process acts **over generations**, producing traits that support successful survival and reproduction in the new environment.
- **Adaptation** is any alteration to the **structure**, **function**, or **behavior** of an organism resulting from **natural selection.**
- **Adaptation** makes the organism **better suited to survive and reproduce** in its environment.
- If a species **does not possess traits** that enable **survival** in its environment or **adaptation** to changes in the environment, then the species may become **extinct.**

You should be able to:

- *explain the relationship among **mutations**, **variations in traits** in a population, and **natural selection** .*
- *compare **natural selection** and **extinction** .*
- *explain how **mutations** differ from **adaptations**.*
- *explain how **genetic variations** in traits in a population increase some individuals' **probability** of **surviving** and **reproducing** in a specific environment*

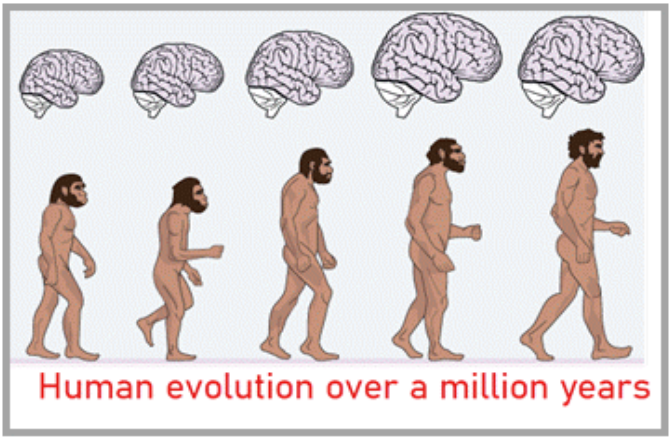


The Fossil Record

The Fossil record, Genetic information, and Anatomical comparisons provide evidence for Evolution

- The **fossil record** documents the **existence**, diversity, **extinction**, and **change** of many life forms and their environments through Earth's history.
- The **fossil record** and comparisons of **anatomical similarities** among organisms enables the inference of lines of **evolutionary descent**.
- The **theory of evolution** is a shared understanding that encapsulates our current understanding of how biological systems **change over time**.
- Mechanisms which **drive evolution** include **mutation**, **adaptation**, **natural selection**, and **extinction**.
- Evidence for evolution is drawn from a variety of data sources, including the **fossil record**, **genetic information**, and **anatomical similarities** across species.

Environmental factors and Genetic variation, influence survivability and diversity of organism


Human evolution over a million years

- Organisms can be described by their physical features, such as color, shape, body covering, and height.
- Although individuals within a population have the same basic physical characteristics, close examination will reveal slight variations for a given trait.
- Genetic variations occur randomly among individuals of any population and may or may not help the individual organism survive and reproduce in its environment.


Genetic Variation

- The expression of many traits involves both **inheritance** and the **environment**.
- Individuals of a population each exhibit a range of **variations** in a trait as a result of the variations in their **genetic codes**.
- **Genetic variations** create **diversity** within a species.
- Changes in **environmental factors** such as habitat loss, increased pollution, climate change, and invasive species can challenge the **survival** of members of a population.
- Organisms that **survive pass their traits** on to offspring.

You should be able to:

- *describe the role of **fossils** in determining events in Earth's history.*
- *explain how the **anatomical similarities** and **differences** among modern organisms and between modern and fossil organisms to infer **evolutionary** relationships .*
- *explain how **genetic variations** in offspring, which leads to variations in **successive generations**, can result from the **same two parents**.*
- *construct an evidence-based explanation about how **environmental factors** and **genetic variation** can influence a species' survival, reproduction, and diversity.*
- *explain what is meant by the phrase, "**survival of the fittest**".*