Evolutionary History
Paleontologist

• Scientist who study fossils.
Sedimentary Rocks

- Rich source of fossils.
- Form when particles settle out of water.
- The sequence of strata indicates relative age.
Radioactive Dating

- Used to determine the ages of rocks and fossils.
- Measures the decay of radioactive isotopes.
- **Half life** (fixed rate of decay).

**Example:**
1. $^{14}$C - half life of 5600 years
2. Potassium$^{40}$ – half life of 1.3 billion years
Fossil Record

• Chronicles *macroevolution*

• *Continental drift* (plate tectonics) and *mass extinctions* have shaped the history of life.
Continental Drift

• Movement of earth’s crustal plates (plate tectonics).

• Pangaea: single land mass (248 MYA).

• Laurasia and Gondwana: two land masses (135 MYA).

• Evidence:
  1. side-necked turtles (turtles of Gondwana)
  2. San Andreas Fault in California
Mass Extinctions

- **Loss** of enormous number of species.

- **Example:**
  
  **65 million years ago** the dinosaurs disappeared.
Phylogeny

- Evolutionary history of a group of organisms.

- Phylogenetic Trees: diagrams the evolutionary history of an organism or group of organisms.
Systematics

- Classifying organism by phylogeny.

Example: domesticated cat

Kingdom: Animalia (animals)
Phylum: Chordata (chordates)
Subphylum: Vertebrata (vertebrates)
Class: Mammalia (mammals)
Order: Carnivora (carnivorans)
Family: Felidae (cats)
Genus: Felis
Species: domestica
Apes: Our Closest Relatives

- Gibbons, orangutan, gorilla, and chimpanzee are closely related to humans.

- Misconception:
  Humans descended from apes.
Apes: Our Closest Relatives

• **Truth:**
  Apes and hominids diverged from a common apelike ancestor (4-5 MYA).

![Evolutionary tree diagram showing the relationships between humans, chimpanzees, gorillas, and orangutans, with a common ancestor 4-5 MYA.]
Apes: Our Closest Relatives

- **Remember:**
  
  **Humans** and **chimpanzees** have a **common ancestor** and are **more** closely related to each other than any of the other **apes**.