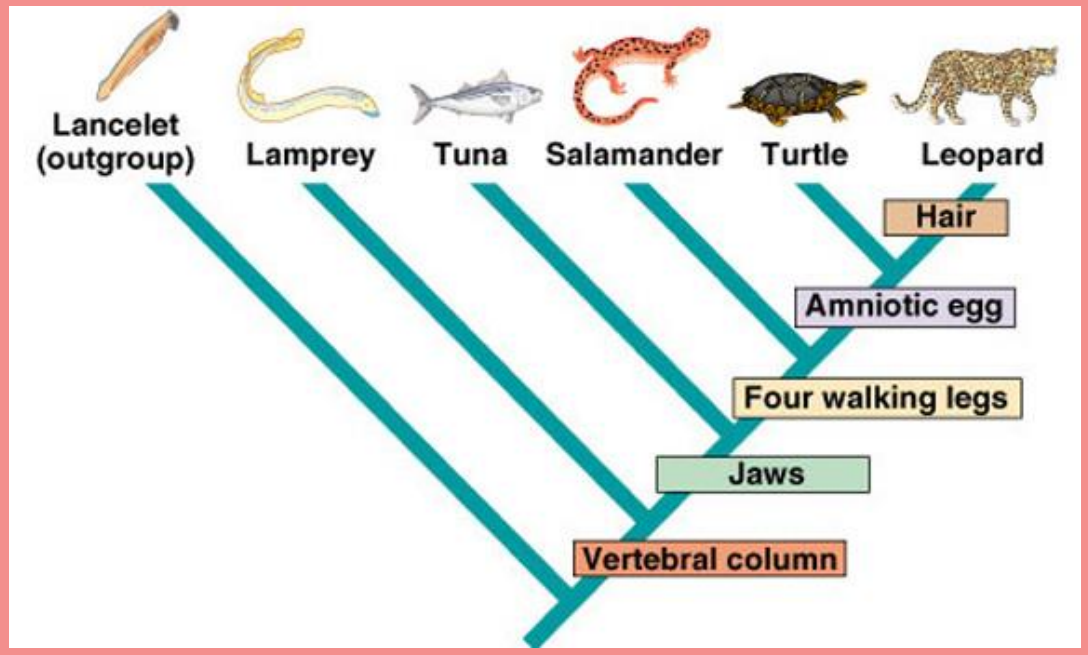
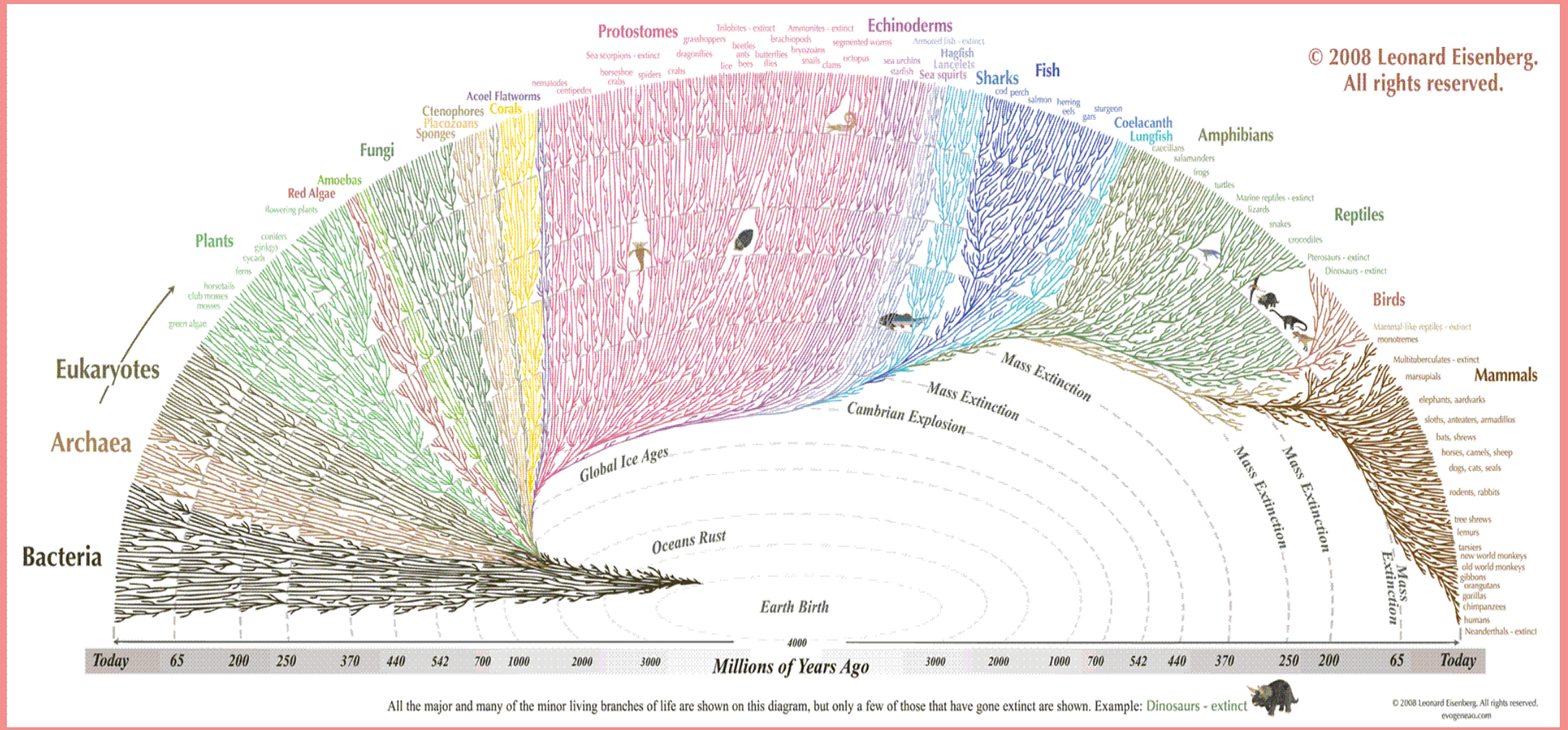
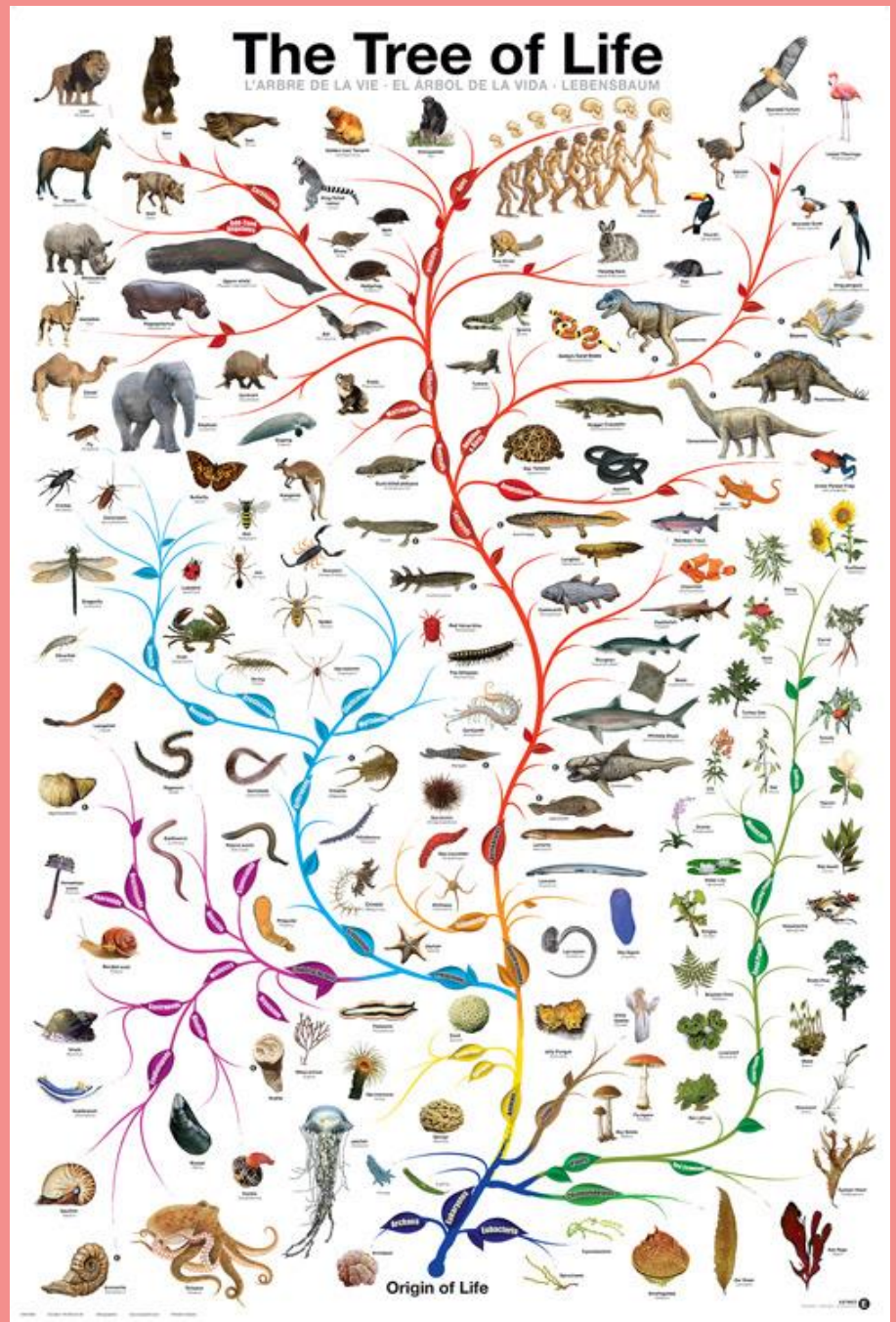
Descent with Modification

- Descent with Modification
  - Each living species has descended with changes from other species over time
  - Over long periods of time Natural Selection produces organism with
    - different structures
    - Different niches
    - Different habitats
      - Results in species looking very different from ancestors
- Common Descent – all living organisms are related to one another
  - A single tree of life links ALL living things



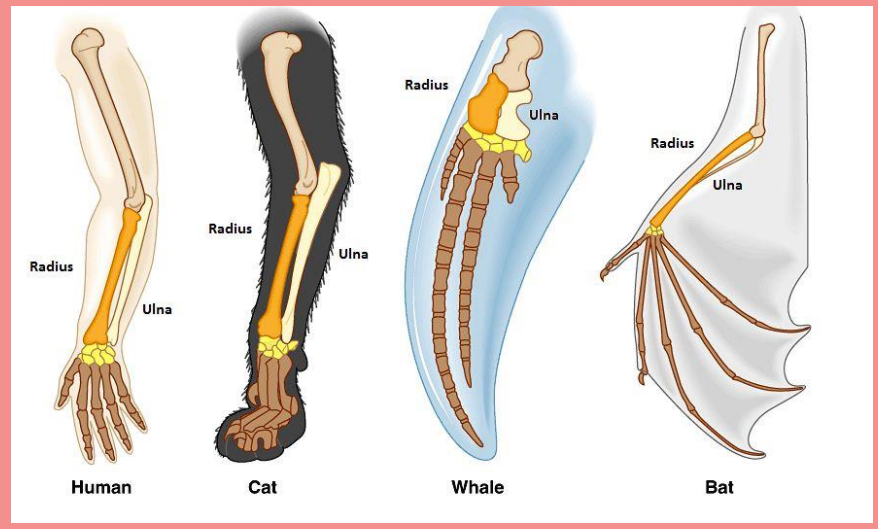


All the major and many of the minor living branches of life are shown on this diagram, but only a few of those that have gone extinct are shown. Example: Dinosaurs - extinct


The Tree of Life
L'ARBRE DE LA VIE · EL ÁRBOL DE LA VIDA · LEBENSBAUM
Origin of Life

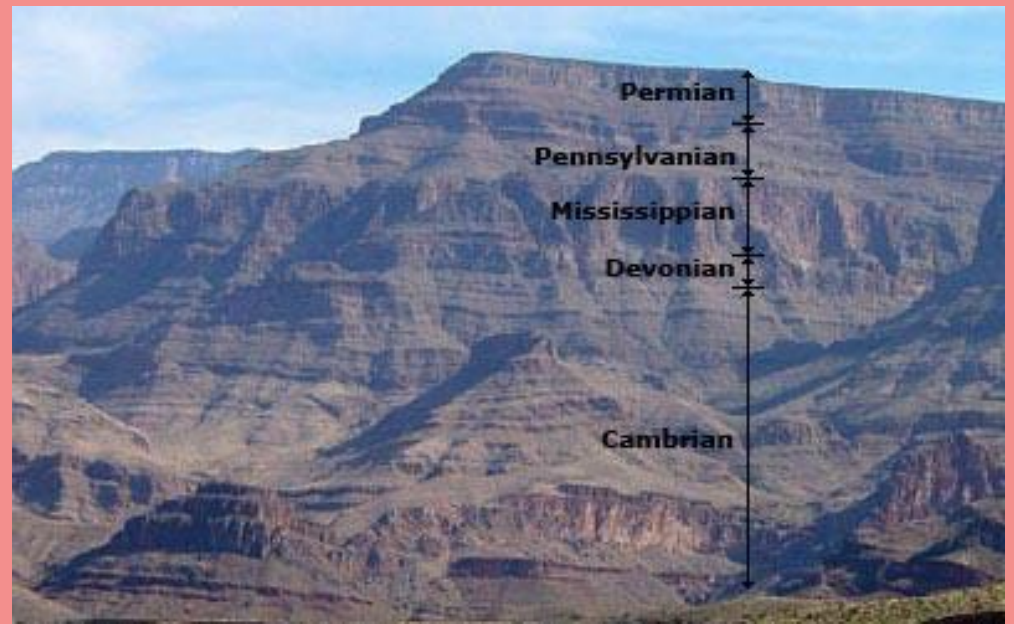
Evidence for Evolution:

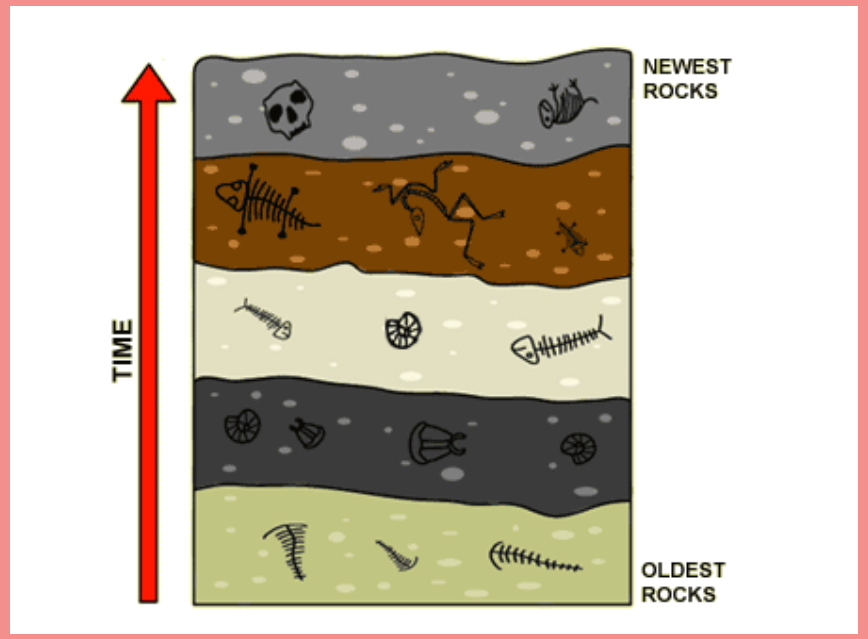
- Living things have been evolving on Earth millions of years
- Evidence of this has come from:
  - Fossil Record
  - Distribution of Living species
  - Homologous Body Structures
  - Vestigial Organs
  - Embryology



The Fossil Record

- **Fossils**: a record of the history of life on Earth
  - Remains of ancient life





Archaeopteryx

- Missing link between reptiles and birds

Fossil Record

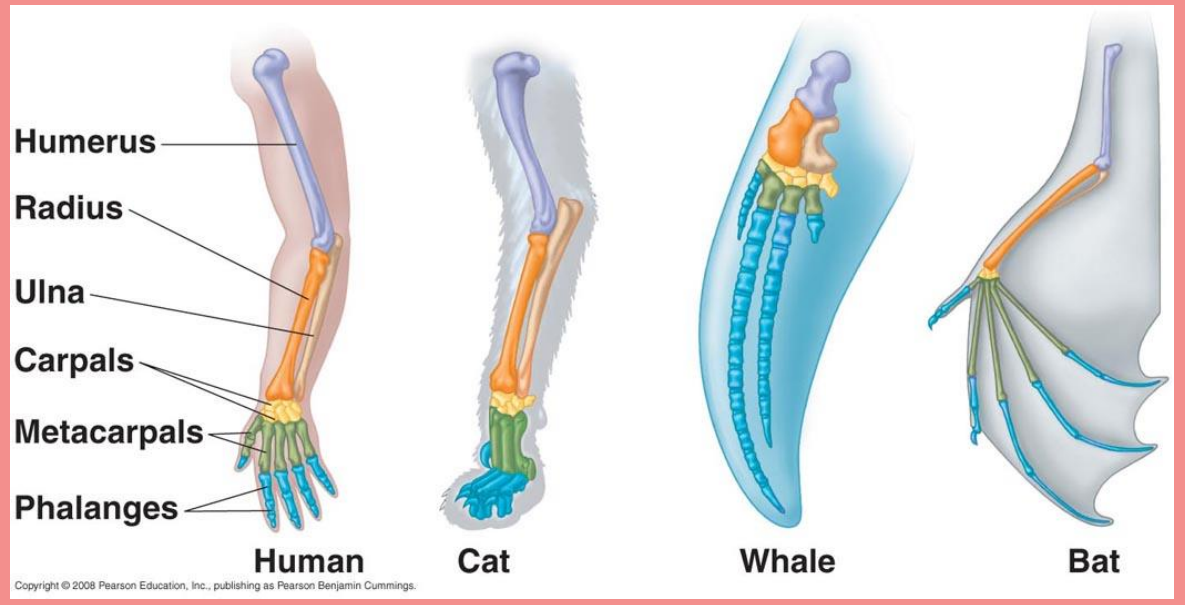
- Comparing fossils in older rock to younger rock we can document that life on earth has changed over time
- Includes a variety of extinct organisms that are related to one another and living species
- The number of fossils has grown enormously
  - Documented intermediate stages in evolution of modern species

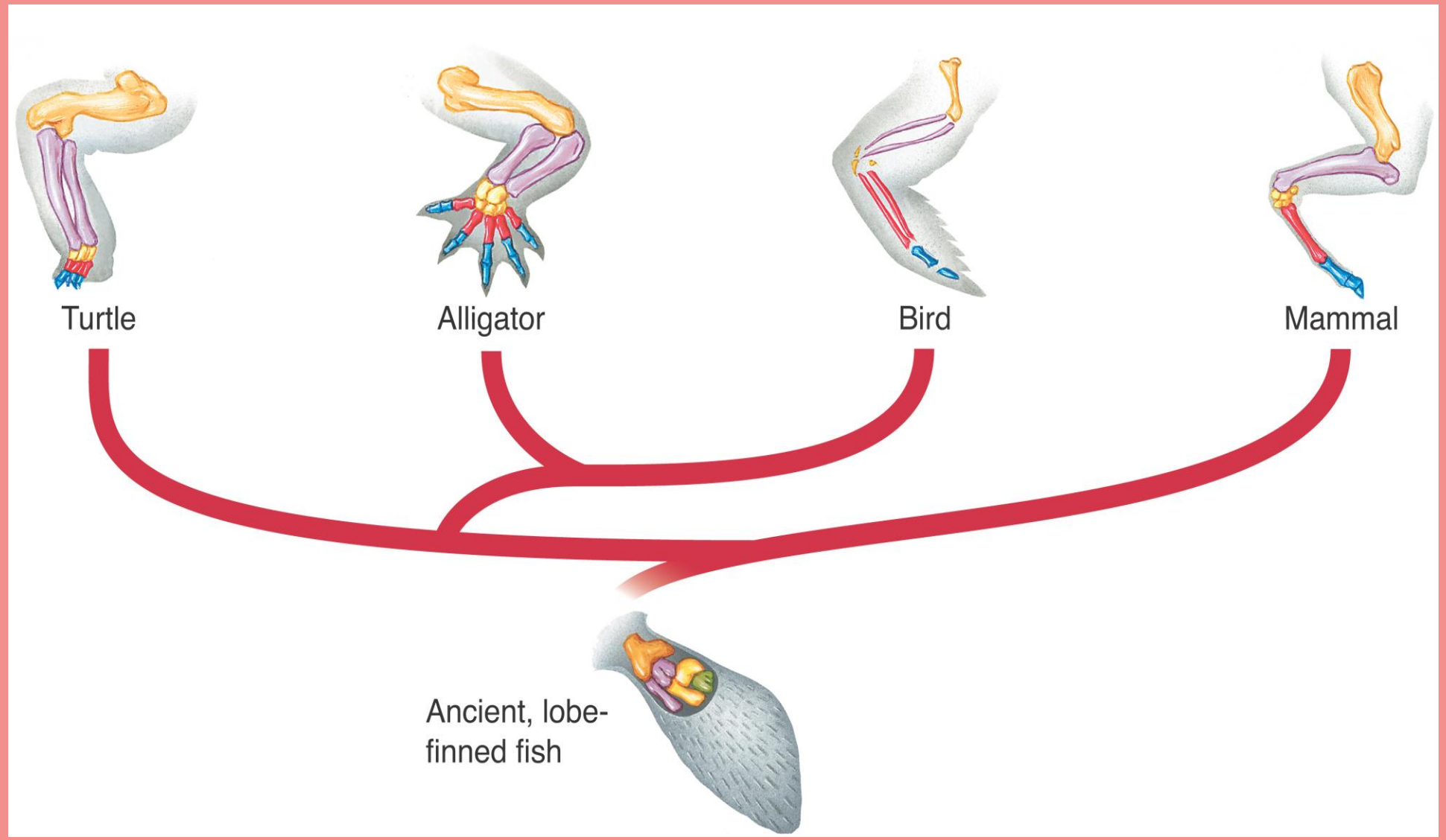
Distribution of Living Species

- Unrelated species having similar anatomies and behaviour
  - Living under same ecological conditions
    - Exposed to similar pressures of Natural Selection
      - End up evolving with similar features
- How can two species that look very different from each other be more closely related than two other species who look similar?

Homologous Body Structures

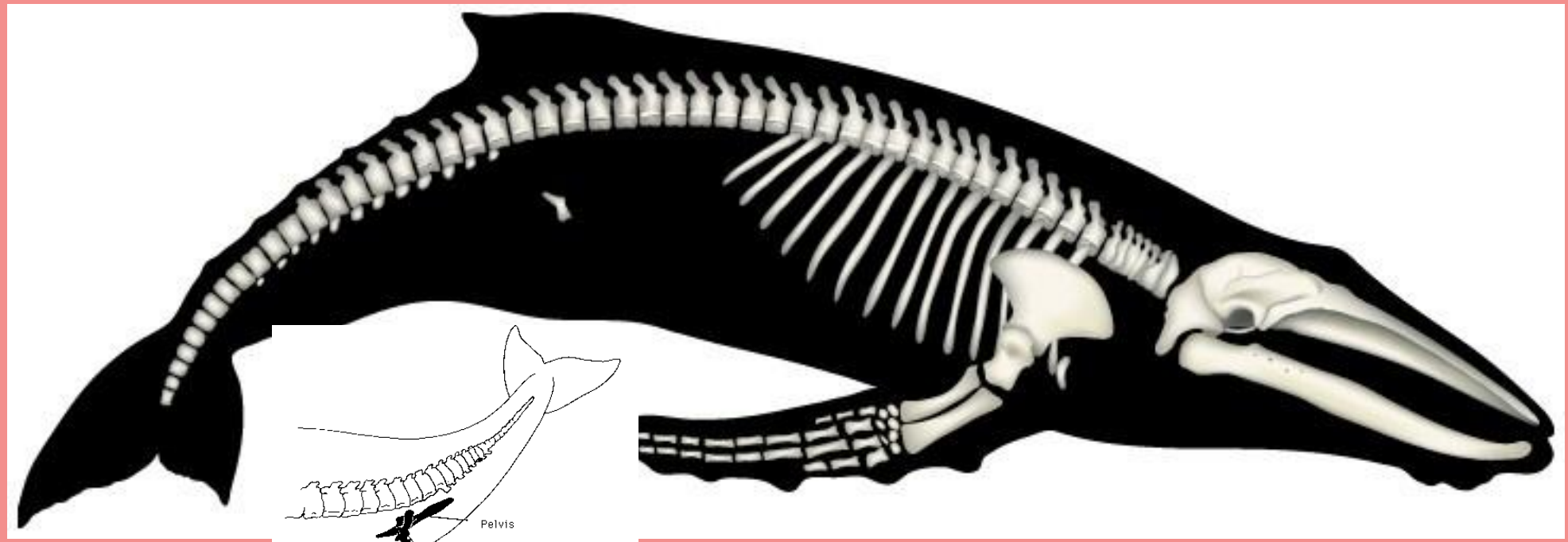
- **Homologous Body Structures:**
  - Similar anatomy in different types of animals because of common ancestor
  - Striking anatomical similarities among the body parts of animals with backbones
  - Limbs of reptiles, birds and mammals vary greatly in form and function yet all constructed from the same basic bones
  - Each limb has adapted to enable organisms to survive in different environments




Turtle
Alligator
Bird
Mammal
Ancient, lobe-finned fish

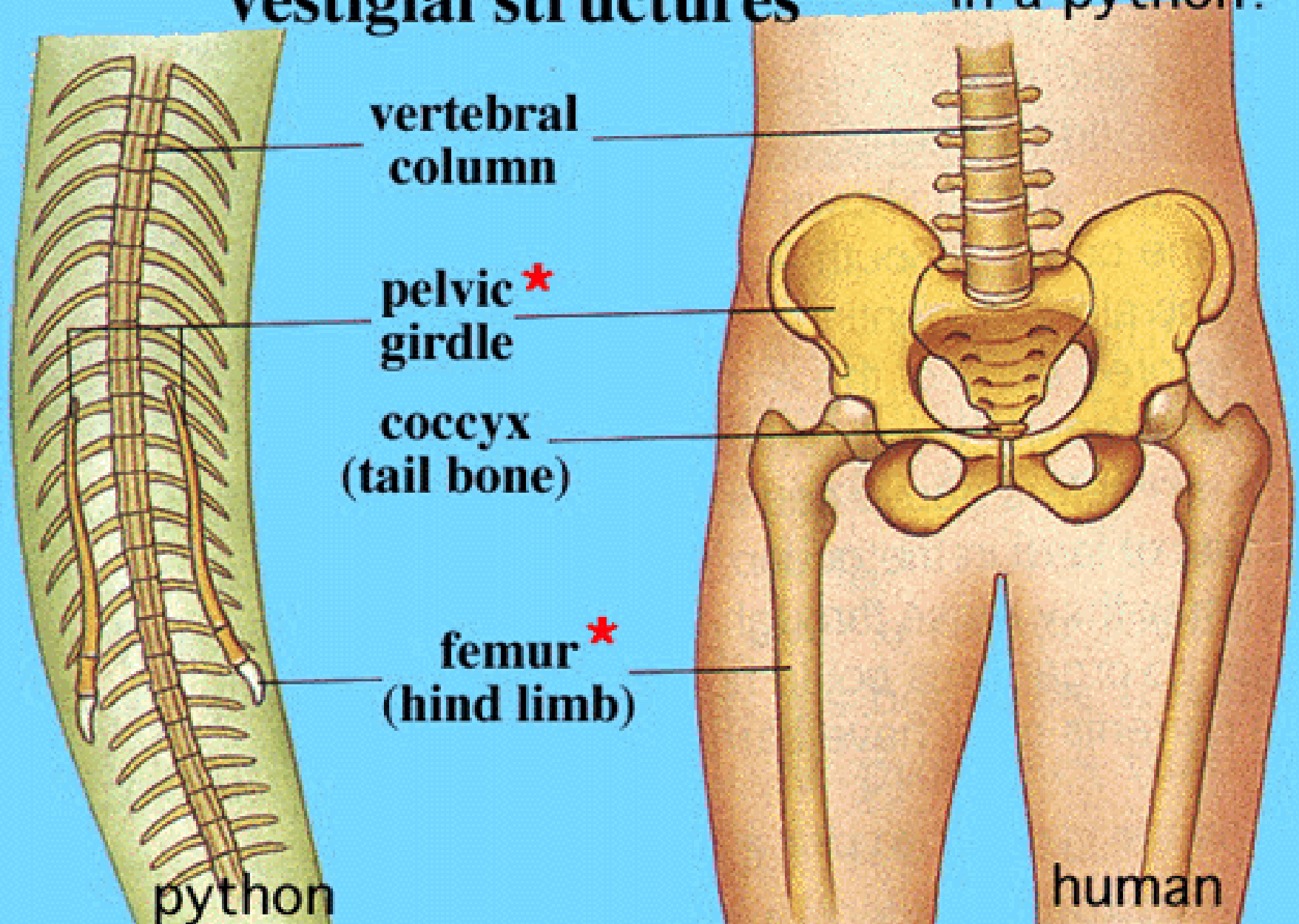
Vestigial Organs

- Vestigial Organs: "leftover" traces of evolution that serve no purpose
  - Why do they still exist?
    - Does not affect the organisms ability to survive/reproduce



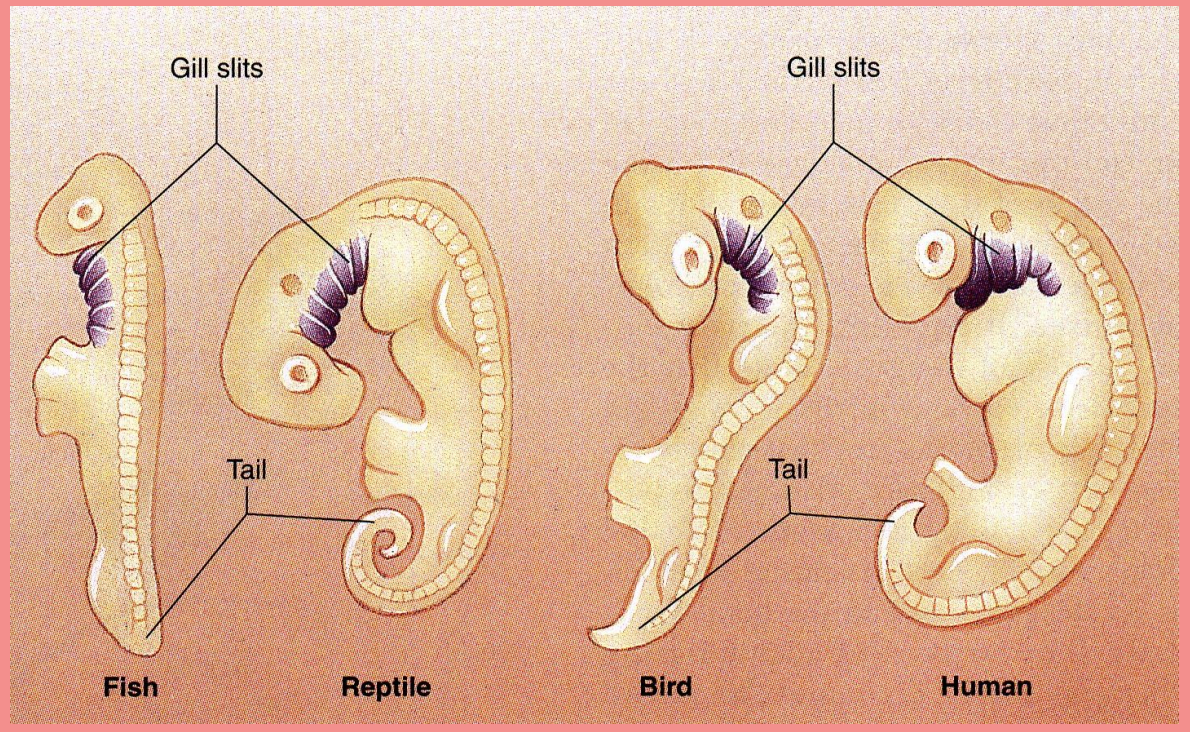
How do you explain the presence of these bones

vestigial structures* in a python?



Embryology

- **Embryology**: embryos of all vertebrates are very similar early on



Barbellus Fossil Activity

- In groups of 2 you will need
  - Activity sheet
  - Large sheet of white paper
  - Glue
  - Scissors