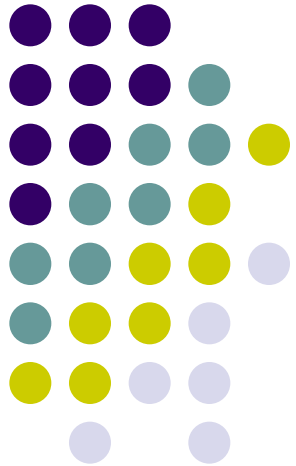
Evidence of Evolutionary Theory



- There are 4 different forms of evidence to support the theory of evolution:
  - Fossil evidence
  - Anatomical evidence
  - Embryological evidence
  - Biological evidence

Fossil Evidence

- Fossils <u>are preserved/mineralized remains or imprint of an organism that lived long ago</u>.
- Most fossils are found in layers (strata) of sedimentary rock.
- The fossil record traces history of life and provides a record of Earth's past life-forms (fossilized species found in older rocks are different from those found in newer rocks)

Fossil Evidence

- Transitional or intermediate forms reveal links between groups of organisms (i.e. amphibians and reptiles).
- While some intermediate fossils are still missing, it may be because many species lived in environments where fossils do not form.

Fossil Evidence

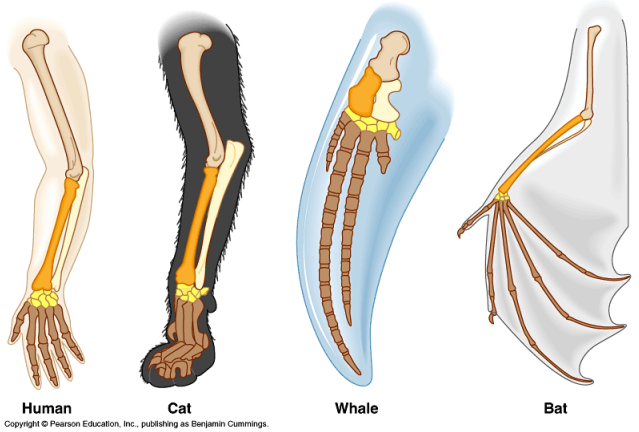
- Through radioactive dating, geologists estimate the age of the earth at about 4.5 billion years .
- Fossils prove that organisms have inhabited Earth for most of its history.
- All organisms living today share a common ancestry with earlier simpler life-forms.

Anatomical Evidence

- Many organisms have anatomical similarities even though the structures' functions may differ indicating descent from a common ancestor.
- There are three ways that scientists view anatomical evidence:
  - Homologous structures
  - Analogous structures
  - Vestigial structures

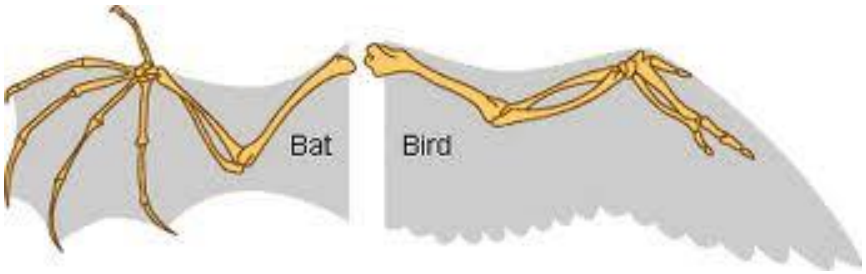
Anatomical Evidence

- Homologous structures are structures inherited from a common ancestor that are similar in two organisms
  - Example: Vertebrate forelimbs contain the same sets of bones organized in similar ways, despite their dissimilar functions



Anatomical Evidence

- Analogous structures are structures inherited from different ancestors and that have come to resemble each other because they serve a similar function
  - Example: Bird wing & bat wing are both for flight but they are structurally different

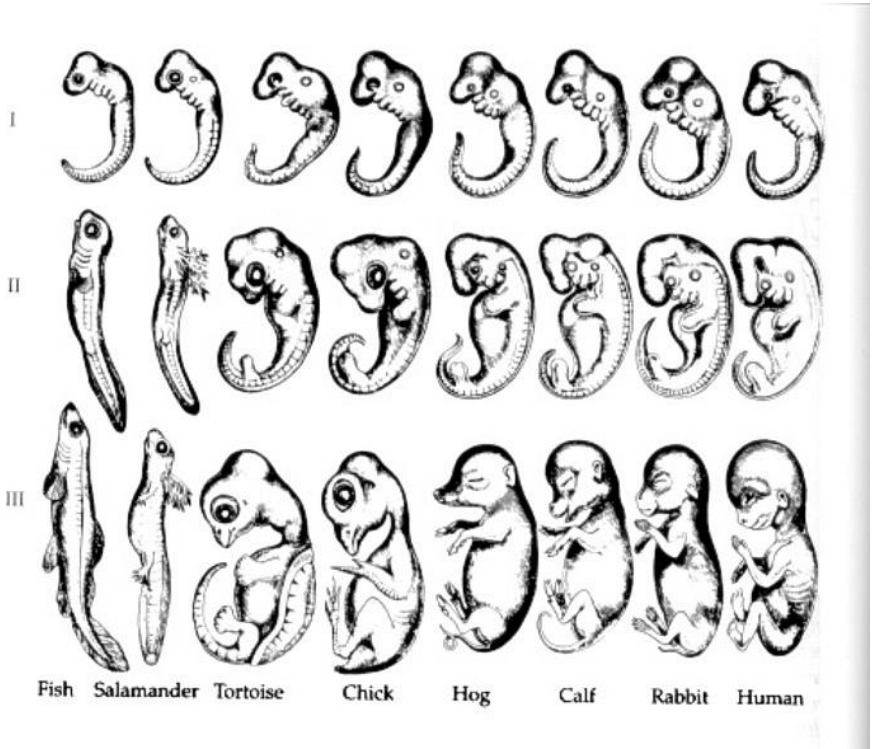


Anatomical Evidence

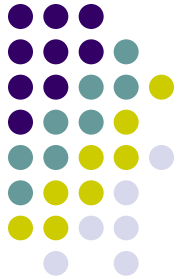
- Vestigial Structures are remains of a structure that is no longer functional but show common ancestry
  - Example: Humans have a tailbone but no tail and whales have a femur and pelvis bone, but no legs.

Embryological Evidence

- During development, all vertebrates have a tail, buds that become arms, and pharyngeal pouches.
- Organisms that show similarities in their embryonic development may have a common ancestry.



Biochemical Evidence



- Almost all living organisms use the same basic biochemical molecules.
  - DNA, ATP, enzymes
- Similarities in amino acid sequences, DNA codes, etc. can be explained by descent from a common ancestor.
- Species descended from a recent common ancestor should have fewer amino acid differences between their proteins, DNA, etc. than do species that share a common ancestor in the more distant past.
- Some proteins develop more rapidly in some groups which may mean that changes in proteins may not reflect evolutionary relationships.