

# What is the Evidence for Evolution?

## Worksheet

The evidence for evolution includes fossils showing gradual change over time, homologous structures shared across related species, similarities in early embryos, species distribution patterns, and DNA/protein similarities that match predicted evolutionary relationships.

## Questions

- Homologous structures like a human arm and a whale flipper are evidence of
  - convergent evolution
  - common ancestry
  - unrelated design
  - genetic drift only
- Which field studies fossils to reveal a chronological sequence of evolutionary change?
  - Embryology
  - Paleontology
  - Biogeography
  - Taxonomy
- Human and chimpanzee DNA being ~98-99% similar suggests
  - no evolutionary relationship
  - a very recent common ancestor
  - identical species
  - a distant common ancestor
- Bird wings and insect wings look similar but evolved independently - this is an example of
  - homologous structures
  - analogous structures (convergent evolution)
  - vestigial structures
  - embryological evidence
- The forelimbs of humans, whales, bats and cats have the same basic bone arrangement (humerus, radius, ulna, carpals) despite very different functions (grasping, swimming, flying, walking). What does this demonstrate?
- Human and chimpanzee DNA sequences are about 98-99% identical, while human and mouse DNA is about 85% identical. What does this pattern suggest about evolutionary relationships?
- Fossil horse species found in rock layers show a size increase from about 0.4 m tall (Eohippus, ~55 million years ago) to about 1.6 m tall (modern Equus, present). What does this sequence show?
- Define: What are homologous structures?
- Define: What is an example of biogeographical evidence for evolution?
- Define: How does the fossil record support evolution?

## Answer Key

1. B) common ancestry - Homologous structures share the same underlying skeletal plan because they were inherited from a common ancestor.
2. B) Paleontology - Paleontology is the study of fossils, which are dated using rock layers to show change over time.
3. B) a very recent common ancestor - High DNA similarity indicates a recent shared ancestor - the more similar the DNA, the closer the relationship.
4. B) analogous structures (convergent evolution) - Analogous structures serve similar functions but arose independently in unrelated lineages, unlike homologous structures.
5. Same underlying skeletal structure across very different functions = homology. Homologous structures indicate common ancestry, not independent (convergent) evolution. This is comparative anatomy evidence for evolution.
6. Higher DNA similarity = more recent common ancestor. 98-99% similarity (human-chimp) very recent shared ancestor. 85% similarity (human-mouse) more distant shared ancestor. This matches the evolutionary tree built independently from fossils and anatomy - cross-validating molecular evidence.
7. Rock layers are dated, giving a time sequence. Fossils show gradual, stepwise changes in size, toe number, and tooth structure over ~55 million years. This gradual transitional sequence is direct fossil evidence of evolutionary change.
8. Structures with the same underlying anatomy inherited from a common ancestor, even if they serve different functions (e.g., human arm and bat wing).
9. Australia's unique marsupials evolved in isolation after the continent separated from other landmasses, unlike anywhere else.
10. It shows a chronological sequence of gradually changing organisms, including transitional forms like Tiktaalik (fish-to-tetrapod).

### **Bounlu**

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