4.1.3 The Evidence for Evolution

Evolution is the gradual change in living organisms over a long period of time. Scientists have discovered many types of evidence that prove evolution is real. These pieces of evidence help explain how organisms have changed and adapted throughout history.

1. Fossil Evidence

Fossils are preserved remains or traces of organisms that lived in the past. Fossils are usually found in rocks and provide important information about extinct organisms. Fossil evidence shows that: Ancient organisms were different from modern organisms. Organisms changed gradually over time. Some species became extinct. **Examples:** Dinosaur fossils prove that dinosaurs once lived on Earth. Human fossils help scientists study human evolution.

2. Comparative Anatomy

Scientists compare body structures of different organisms to understand their evolutionary relationships. **Homologous Structures**
Homologous structures are body parts that have similar structures but different functions. **Examples:** Human arm Bird wing Whale fin Cat forelimb These structures suggest that organisms share a common ancestor.

Analogous Structures
Analogous structures perform similar functions but have different structures. **Example:** Bird wings and insect wings

Vestigial Organs
Vestigial organs are reduced organs with little or no function. **Examples:** Human appendix Tail bone in humans

3. Embryological Evidence

Embryology is the study of embryos and their development. Embryos of many vertebrates look similar during early stages of development. **Examples:** Fish embryo Bird embryo Human embryo These similarities suggest that organisms evolved from common ancestors.

4. Biogeographical Evidence

Biogeography studies the distribution of organisms around the world. Different regions contain different species because organisms adapt to their environments over time. **Examples:** Finches on the Galápagos Islands Kangaroos in Australia Biogeography shows how environmental conditions influence evolution.

5. Molecular Evidence

Scientists compare DNA and proteins of organisms to determine evolutionary relationships. **Example:** Human DNA is very similar to chimpanzee DNA. The more similar the DNA, the closer the evolutionary relationship.

6. Natural Selection as Evidence

Natural selection is the process in which organisms with favorable traits survive and reproduce more successfully. **Examples:** Antibiotic-resistant bacteria Insects resistant to pesticides These examples show that evolution continues even today.

Summary

The major evidence for evolution includes: Fossil evidence Comparative anatomy Embryological evidence Biogeographical evidence Molecular evidence Natural selection All these forms of evidence strongly support the theory of evolution.

Summary Questions and Answers

What is evolution?
Evolution is the gradual change in living organisms over time. **What is a fossil?**
A fossil is the preserved remain or trace of an ancient organism. **What are homologous structures?**
Homologous structures are body parts with similar structures but different functions. **What are vestigial organs?**
Vestigial organs are reduced organs with little or no function. **How does embryology support evolution?**
Embryos of different organisms look similar during early development, suggesting common

ancestry. **What does DNA evidence show?**

DNA evidence shows evolutionary relationships between organisms. **What is natural selection?**

Natural selection is the survival and reproduction of organisms with favorable traits.