

SECTION 5-3

SECTION SUMMARY

Other Evidence for Evolution

Guide for Reading

- ◆ What evidence from modern-day organisms can help scientists determine evolutionary relationships among groups?

Modern-day organisms can provide clues about evolution. By comparing organisms, scientists can infer how closely related the organisms are in an evolutionary sense. **Scientists compare body structures, development before birth, and DNA sequences to determine the evolutionary relationships among organisms.**

An organism's body structure is its basic body plan, such as how its bones are arranged. Fishes, amphibians, reptiles, birds, and mammals, for example, all have a similar body structure—an internal skeleton with a backbone. This is why scientists classify all five groups of animals together as vertebrates. Presumably, these groups all inherited these similarities in structure from an early vertebrate ancestor that they shared. Similar structures that related species have inherited from a common ancestor are called **homologous structures**. Sometimes scientists find fossil evidence that supports the evidence provided by homologous structures. For example, fossils show that the ancestors of today's whales had legs and walked on land. This supports other evidence that whales and humans share a common ancestor.

Scientists can also make inferences about evolutionary relationships by comparing the early development of different organisms. For example, an adult turtle, a chicken, and a rat look quite different. But during early development these three organisms go through similar stages. These similarities suggest that these three vertebrate species are related and share a common ancestor.

Scientists infer that species with similar body structures and development patterns inherited many of the same genes from a common ancestor. Recall that genes are made of DNA. By comparing the sequence of nitrogen bases in the DNA of different species, scientists can infer how closely related the species are. The more similar the sequences, the more closely related the species are. Recall also that the DNA bases along a gene specify what type of protein will be produced. Thus, scientists can also compare the order of amino acids in a protein to see how closely related two species are. Recently, scientists have developed techniques that allow them to extract, or remove, DNA from fossils. The DNA from fossils has provided new evidence about evolution.

Scientists have combined evidence from fossils, body structures, early development, and DNA and protein sequences to determine the evolutionary relationships among species. In most cases, DNA and protein sequences have confirmed conclusions based on earlier evidence. Scientists use such combined evidence to construct branching trees. A **branching tree** is a diagram that shows how scientists think different groups of organisms are related.

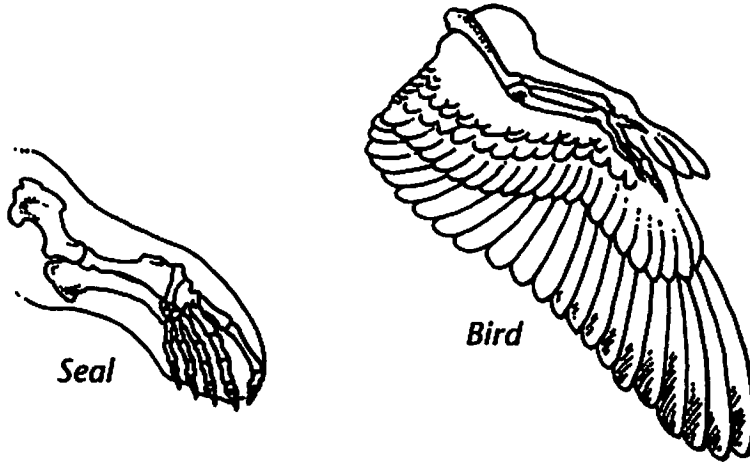
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REVIEW AND REINFORCE

Other Evidence for Evolution

◆ Understanding Main Ideas

Use the figures below to answer the questions 1 through 4. Write your answers to all the following questions on a separate sheet of paper.



1. Compare and contrast the bones of a bird's wing and a seal's flipper.
2. What do scientists infer from the similarities between these two structures?
3. What do scientists call such similar structures?
4. Describe how DNA evidence might be used to confirm scientists' conclusions about any relationship between birds and seals.
5. What types of evidence do scientists use to determine evolutionary relationships among groups?
6. What do similarities in the early development of organisms suggest?

◆ Building Vocabulary

Fill in the blank to complete each statement.

7. Similar structures that related species have inherited from a common ancestor are called _____ structures.
8. A(n) _____ is a diagram that shows how scientists think different groups of organisms are related.