

Lesson Self-Check

CAN YOU EXPLAIN IT?

FIGURE 15: Modern birds such as chickens are thought to have descended from the same ancestor as feathered dinosaurs such as *Archaeopteryx*.



a Modern chicken



b *Archaeopteryx* fossil

Archaeopteryx has been called both the first bird and a 'feathered dinosaur.' Either way, it shares features of both birds and dinosaurs. First discovered around 1860, it has been studied vigorously for over a century, although only 12 very detailed and well-preserved fossils have been found in that time. The evolutionary history of modern birds may never be completely understood, but *Archaeopteryx* helps to fill in the gaps of this evolutionary timeline.



Explain What evolutionary evidence supports the conclusion that chickens and other modern birds are descendants of dinosaurs? Refer to the notes in your Evidence Notebook and write a short explanatory text that cites specific evidence from this lesson about lines of evidence for evolution to support your claim, and explain your reasoning.

The fossil record gives a rich history of the changing diversity of life on our planet. Anatomical details such as homologous and vestigial structures help to link species together. By examining the earliest developmental stages of organisms, we can see shared features among different species, such as a similarity in appearance between barnacle and crab larvae and similar developmental patterns in vertebrate embryos.

In addition, molecular and genetic evidence such as DNA and amino acid sequences provide evidence that can be used to determine the evolutionary relationships among different species. Taken together, these forms of evidence, put forth by different branches of science, overwhelmingly support the concept that living things change over time, yet are all descendants from a common ancestor.

CHECKPOINTS

Check Your Understanding

1. By examining the fin of a primitive fish, scientists have found similarities in bone structure to that of modern-day reptiles, birds, and mammals. What type of evidence does this describe?

- a. vestigial structures
- b. embryonic structures
- c. analogous structures
- d. homologous structures

2. *Astyanax mexicanus* is a species of tetra fish that dwells in bodies of water deep inside caves. Even though they cannot see, these fish still have small, nonworking eyes. Their eyes are examples of which type of structures?

- a. embryonic
- b. vestigial
- c. homologous
- d. analogous

3. The idea that present geologic processes are the key to the past is a tenet of which geologic theory?

- a. gradualism
- b. catastrophism
- c. uniformitarianism
- d. metamorphism

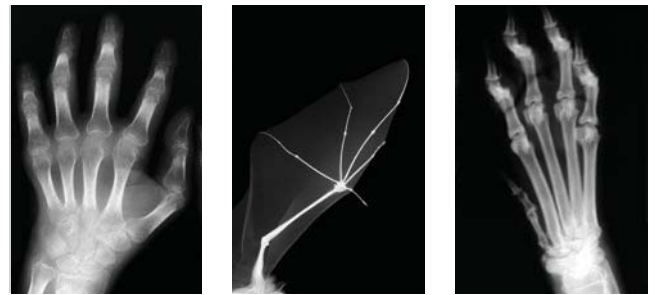
4. As embryos, all vertebrates have which of the following structures? Select all correct answers.

- a. pharyngeal arches
- b. limb buds
- c. tail
- d. lungs

5. The similarity in homologous structures between different species is evidence that they

- a. share a common ancestor.
- b. are members of the same genus.
- c. use the similar structures in the same way.
- d. evolved from each other.

FIGURE 16: Anatomical Structures



6. Which of the following statements correctly describes the evidence shown by the structures in Figure 16?

- a. The bat and the dog share analogous bone structures in their forelimbs.
- b. Only the human and the bat share homologous bone structures in their forelimbs.
- c. The human and the bat share analogous bone structures in their forelimbs.
- d. All three species share homologous structures in their forelimbs.

7. How are genes and proteins similar to homologous structures when determining evolutionary relationships among species?

8. The hummingbird is more closely related to a lizard than it is to a dragonfly. How can you explain why two species that look similar are not necessarily that closely related?

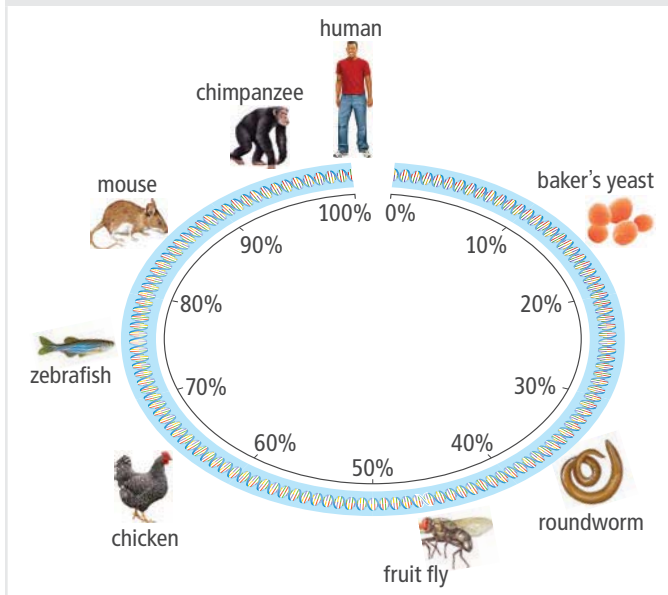
9. How can the location of a fossil reveal its age? Explain your answer.

10. Paleontology is the study of fossils or extinct species. Explain how this field is important to the study of evolutionary biology.

11. You have discovered the fossil remains of three organisms. One is mammalian, one is reptilian, and the third has both mammalian and reptilian characteristics. What techniques could you apply to determine possible relationships among these organisms?

MAKE YOUR OWN STUDY GUIDE

FIGURE 17: Shared DNA



Use Figure 17 to answer Questions 12 and 13.

- 12.** Humans share the most DNA with which of the following species of animal?
- zebrafish
 - fruit fly
 - roundworm
 - chimpanzee
- 13.** Which organism do you think would be the best choice to use as a model organism in human health studies? Explain your answer.



In your Evidence Notebook, design a study guide that supports the main idea from this lesson:

Multiple lines of evidence support common ancestry and evolution.

Remember to include the following information in your study guide:

- Use examples that model main ideas.
- Record explanations for the phenomena you investigated.
- Use evidence to support your explanations. Your support can include drawings, data, graphs, laboratory conclusions, and other evidence recorded throughout the lesson.

Consider how evidence from various fields of science can be used to support the idea of evolution and common ancestry. Remember that the same processes that formed fossil remains millions of years ago are still at work today.