

The Fossil Record of Bats

Purpose of Chapter: The purpose of Chapter 9 is to describe the fossil record of bats and compare this fossil record to Darwin's prediction. Darwin predicted that as more fossils were found, the evolutionary intermediate ancestors for bats would also be found. This means that the fossil record would eventually show a ground animal (possibly about the size of a mouse) slowly changing into a bat. According to both evolution scientists and scientists who oppose evolution, all of the predicted evolutionary ancestors of bats are missing. (See pages 75–76 of Chapter 6 for a further discussion of the predictions of the fossil record.)

Class Discussion Questions for Teacher:

These generally should be discussed in class before the students read the chapter.

1. What kind of animal is a bat? Is it a bird? A reptile? A mammal? Why?

Answer: Bats are mammals because they are warm-blooded, have hair, and suckle their young, as do all mammals.

2. How do bats catch flying insects at night when it is completely pitch black?

Answer: Bats have a sophisticated sonar-like system called echolocation.

3. The theory of evolutions suggests that bats (flying mammals) arose from a non-flying mammal, a mammal possibly about the size of a mouse. Describe what would have to occur for a land mammal, say a mouse, to become a bat. What changes would have to occur? List five of these changes on the blackboard.

Answer: The ground animal would have to form **wings**. It would have to **grow extra long fingers** to form the wings. It would have to form a **cape-like membrane** on each arm. Its bones would have to change from solid bones for walking on the ground into **lightweight hollow bones** for flight. It would have to **transfer its largest muscles** from the back legs for running to the front legs to power the wings. It would have to develop a **sonar-like echolocation** system for catching insects in flight.

4. Could an animal, such as a mouse, develop wings simply by repeatedly moving its front arms up and down? Why or why not?

Answer: No. The law of acquired characteristics (the law of use), which was believed by Darwin, was disproved in 1889. (See page 30.)

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Class Discussion Questions for Teacher (continued):

5. By continuously having to jump off small ledges to gather food, could a mammal, such as a mouse, develop wings?

Answer: No. The idea of genetically responding to and adapting to an environmental situation was also disproved in 1889 (see page 30).

6. Could an animal, such as a mouse, develop new structures (such as wings), using the principle of the survival of the fittest, also known as natural selection?

Answer: No. Natural selection only removes certain traits. It does not cause the development of completely new body structures, such as wings or sonar-like echolocation.

7. If a mouse-like animal **could not** evolve into a bat by jumping off small ledges or by natural selection, then how does the theory of evolution suggest an animal similar to a mouse could develop wings and change into a bat?

Answer: The theory of evolution says that a ground mammal changed into a bat by a series of mistaken mutations in the DNA of the reproductive cells. For this to occur, thousands of letters of DNA would have had to change by accident, in the proper location, and in the proper order.

8. Do you think an animal could develop wings, sonar-like echolocation, hollow bones, and so forth, by chance mutations in the DNA of the reproductive cells, as the theory of evolution suggests?

Answer: Let the students discuss.

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Objectives of Chapter 9 for Students:

By studying these objectives and knowing this core information, most students should be able to pass all of the tests.

1. The student should be able to describe how many fossil bats scientists have found so far (page 100).
2. The student should be able to predict what should be found in the fossil record of bats if evolution is true. The student should be able to write out a description of what the theoretical intermediate animals would have looked like (page 100 and page 75 of Chapter 6).
3. The student should be able to predict what should be found in the fossil record of bats if evolution is *not* true (page 100 and page 76 of Chapter 6).
4. The student should be able to describe how many of the theoretical evolutionary ancestors of bats have been found (page 100).
5. The student should know if the ground mammal from which a bat theoretically evolved has been found (page 100).
6. The student should be able to describe why no theoretical evolutionary ancestors of bats have been found, according to scientists who *support* evolution (page 100).
7. The student should be able to describe why no theoretical evolutionary ancestors of bats have been found, according to scientists who *oppose* evolution (page 100).
8. The student should be able to give the name of the fossil layer in which bats first appear. (The age and names of fossil layers are controversial and not agreed on by all scientists.) (Pages 100–101.)
9. The student should be able to compare the appearance of the oldest fossil bats found (to date) to the appearance of modern bats (page 102).
10. The student should be able to describe whether or not any of the fossil bats discovered so far were the intermediate ancestors predicted by Darwin. In other words, were any of the bats discovered non-flying or non-functional bats (page 102)?
11. The student should be able to describe how, according to Dr. Habersetzer, evolution scientists have determined when bat evolution started and what happened in the process of bat evolution (page 104).

(End of Chapter 9 Objectives)

Name: _____

Date: _____

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Test A

1. *True or False:* All fossilized bats found so far appear fully developed and capable of flying. _____

2. *True or False:* The ground animal (or mammal) that bats evolved from has been discovered. _____

3. How many fossil bats have been found to date? _____

4. Have any of the theoretical evolutionary ancestors of bats been found? _____

5. If evolution is true and if the fossil record is good, what should be found regarding the fossil record of bats? _____

6. If evolution is not true and if the fossil record is good, what should be found regarding the fossil record of bats? _____

True or False:

7. Evolution scientists have depended on speculation to decide when bats may have evolved and what happened in the evolutionary process of bat evolution. _____

8. The oldest fossil bats look similar to modern bats. _____

9. Bats first appear in the Eocene fossil layer. _____

10. Scientists who oppose the theory of evolution believe the absence of bat transitional evolutionary forms proves that evolution is not true. _____

Name: _____

Date: _____

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Test B

1. If evolution is *not* true and if the fossil record is good, what should be found regarding the fossil record of bats? _____

2. How many fossil bats have been found to date? _____

3. Have any of the theoretical evolutionary ancestors of bats been found? _____

4. If evolution is true and if the fossil record is good, what should be found regarding the fossil record of bats? _____

True or False:

5. Evolution scientists have depended on speculation to decide when bats may have evolved and what happened in the process. _____

6. The oldest fossil bats look similar to modern bats. _____

7. Bats first appear in the Eocene fossil layer. _____

8. Scientists who oppose the theory of evolution believe the absence of bat transitional evolutionary forms proves that evolution is *not* true. _____

9. All fossilized bats found so far appear fully developed and capable of flying. _____

10. The ground animal (or mammal) that bats evolved from has been discovered.

Name: _____

Date: _____

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Test C

1. *True or False:* Only half of the fossilized bats found so far appear fully developed and capable of flying. _____

2. *True or False:* The ground animal (or mammal) that bats evolved from has *not* been discovered. _____

3. How many fossil bats have been found to date? _____

4. Have any of the theoretical evolutionary ancestors of bats been found? _____

5. If evolution is true and if the fossil record is good, what should be found regarding the fossil record of bats? _____

6. If evolution is *not* true and if the fossil record is good, what should be found regarding the fossil record of bats? _____

True or False:

7. Evolution scientists have depended on speculation to decide when bats may have evolved and what happened in the process, or steps, of bat evolution. _____

8. The oldest fossil bats look very strange when compared to modern bats. _____

9. Bats first appear in the Cambrian fossil layer. _____

10. Scientists who oppose the theory of evolution believe the absence of transitional evolutionary forms leading up to bats proves that evolution is *not* true. _____

Answers Test A

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1. True
2. False (The theoretical ground animal [or mammal] that evolved into a bat has not been found.)
3. 1,000
4. No
5. The fossil record would show a non-flying mammal slowly changing over millions of years of time into a bat. Intermediate animals between the ground animal (or mammal) and the bat would be evident, reflecting (for example) the development of longer finger bones to help in forming the wings, the development of enlarged muscles in the arms to move the wings, the development of a membrane attached to the wings, the development of hollow bones, etc (see page 75 of Chapter 6).
6. There would be no intermediate animals found between the theoretical ground animal (or mammal) and the first bat found in the fossil record (see page 76 of Chapter 6).
7. True
8. True
9. True
10. True

Answers Test B

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1. There would be no intermediate animals found between the theoretical ground animal (or mammal) and the first bat found in the fossil record (see page 76 of Chapter 6).
2. 1,000
3. No
4. The fossil record would show a ground animal slowly changing over millions of years of time into a bat. Intermediate animals between the ground animal (or mammal) and the bat would be evident, reflecting (for example) the development of longer finger bones to help in forming the wings, the development of enlarged muscles in the arms to move the wings, the development of a membrane attached to the wings, the development of hollow bones, etc. (see page 75 of Chapter 6).
5. True
6. True
7. True
8. True
9. True
10. False (The theoretical ground animal [or mammal] that evolved into a bat has not been found.)

Answers Test C

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1. False (All of the fossilized bats found so far have been fully developed and capable of flying.)
2. True
3. 1,000
4. No
5. The fossil record would show a non-flying mammal slowly changing over millions of years of time into a bat. Intermediate animals between the ground animal (or mammal) and the bat would be evident, reflecting (for example) the development of longer finger bones to help in forming the wings, the development of enlarged muscles in the arms to move the wings, the development of a membrane attached to the wings, the development of hollow bones, etc. (see page 75 of Chapter 6).
6. There would be no intermediate animals found between the theoretical ground animal, or mammal, and the first bat found in the fossil record (see page 76 of Chapter 6).
7. True
8. False (All of the fossilized bats found so far have been fully developed, capable of flying, *and* look similar to modern bats.)
9. False (Bats first appear in the Eocene fossil layer.)
10. True