

Bones Through Time

Use fossil data to trace change, diversity, extinction, and relationships.

S7L5.c "Analyze and interpret data for patterns in the fossil record that document the existence, diversity, and extinction of organisms and their relationships to modern organisms."

NAME _____ DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each age in the table, circle each appendage feature, and number the rows 1 through 4 from oldest to youngest. Use your marks to trace patterns of change through the fossil record.

A Record of Changing Vertebrates

- ① Scientists use fossils from rock layers as evidence about life at different times. The data below compare four vertebrates, from an extinct lobe-finned fish to a living salamander. Ages are approximate, in millions of years ago. These records show both a changing variety of body forms and evidence that some forms disappeared.

SELECTED VERTEBRATE FOSSIL DATA

Organism	Approximate Age	Appendage Evidence	Known Living Today?
Eusthenopteron	385 million years ago	Lobed fin with internal bones	No
Tiktaalik	375 million years ago	Fin with wristlike bones	No
Acanthostega	365 million years ago	Limb with eight digits	No
Modern salamander	Today	Front limb with four digits	Yes

- ② Notice that the older fish fossil has a lobed fin with internal bones. In the next two fossils, the appendages show wristlike bones and then digits. The salamander has limbs with digits today. This pattern does not prove that any fossil was a salamander's direct ancestor. Instead, structures and their sequence support the idea that these organisms share distant ancestors.
- ③ Fossil data also have limits. Many organisms did not fossilize, and erosion can destroy rock layers. Scientists look for patterns across sites instead of treating one missing fossil as proof of extinction. Still, a group found in older layers but absent from younger layers, along with no living members, is evidence that the group became extinct. Fossils document past existence.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 List the four organisms from oldest to youngest. What table data helped you place them in that order?

2 How do the different appendage features in the table show diversity among these vertebrates? Name at least two different features.

3 What pattern would support a claim that a fossil group became extinct? Include the evidence about living members.

4 Which conclusion is better supported by the age-and-structure pattern: that every fossil is a modern salamander's direct ancestor, or that the organisms share distant ancestors? Explain.

3 YOUR TURN _____ Your own words

Write exactly two sentences about the table. In the first sentence, describe an appendage pattern across at least three named organisms. In the second sentence, explain what the pattern suggests about relationships and why it does not identify a direct ancestor.

PART 1 • READ AND MARK

Underline each age in the table, circle each appendage feature, and number the rows 1 through 4 from oldest to youngest. Use your marks to trace patterns of change through the fossil record. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	List the four organisms from oldest to youngest. What table data helped you place them in that order?	Eusthenopteron, Tiktaalik, Acanthostega, modern salamander. Their approximate ages place them in order from 385 million years ago to today.
2	How do the different appendage features in the table show diversity among these vertebrates? Name at least two different features.	The vertebrates have different appendages, including a lobed fin with internal bones, a fin with wristlike bones, and limbs with digits.
3	What pattern would support a claim that a fossil group became extinct? Include the evidence about living members.	The group is found in older layers but absent from younger layers, and it has no living members.
4	Which conclusion is better supported by the age-and-structure pattern: that every fossil is a modern salamander's direct ancestor, or that the organisms share distant ancestors? Explain.	The organisms share distant ancestors. Similar structures and their sequence support this relationship, but the data do not prove that any listed fossil was a salamander's direct ancestor.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Across Eusthenopteron, Tiktaalik, Acanthostega, and the salamander, appendages change from a lobed fin with internal bones to wristlike bones and then limbs with digits. This sequence and the shared structures support distant shared ancestors, but it cannot show that any one fossil was a salamander's direct ancestor.

Accept equivalent descriptions of the age sequence and appendage pattern. Students should distinguish evidence for shared ancestry from a claim that one listed fossil was a direct ancestor of the modern salamander.