Bones Across Time

Use fossil and living animals to trace changes in front limbs.

7.15 "Analyze and interpret data from examination of fossils, relict species, and modern organisms to determine patterns of change in anatomical structures over time."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the descriptions of front fins and limbs. Number the two fossils from older to younger, then circle one structure that appears in both a fossil and a living animal.

From Fins to Feet

1. A fossil can preserve the shape of a fin or limb long after an animal dies. Scientists compare bones from fossils with bones in living animals to look for changes across time. A bone in the same position in different animals may have a shared evolutionary history, even when the animals move in different ways.

2. Two fossils in the table came from ancient rocks. Tiktaalik lived about 375 million years ago in shallow water. Acanthostega lived about 365 million years ago and spent much of its life in water. Their preserved front appendages reveal bone shapes, including whether they had wristlike bones or digits. Dates are estimates, not exact birthdays.

3. A coelacanth is a relict species, a living member of a lineage known from much older fossils. Its fleshy fins are not the direct ancestors of salamander legs. A salamander is a living land vertebrate with four digits on each front foot. Compare these animals without assuming one listed species gave rise directly to another.

EVIDENCE FROM FRONT FINS AND LIMBS

Animal	When it lived	Front fin or limb
Tiktaalik	About 375 million years ago	Fin with an upper arm bone, two lower arm bones, and wristlike bones; no digits
Acanthostega	About 365 million years ago	Limb with an upper arm bone, two lower arm bones, wrist bones, and eight digits
Coelacanth	Today	Fleshy fin with internal bones; no digits
Salamander	Today	Limb with an upper arm bone, two lower arm bones, wrist bones, and four digits

2 ANSWER WITH EVIDENCE

Use the passage

1. What change in front appendages do the two fossils show over time? Use their dates and bones as evidence.

2. Which front-limb bones does the living salamander share with both fossils? What does this pattern suggest?

3. The coelacanth lives today. How does comparing it with Tiktaalik show that an older fin feature still exists?

4. How do the digits of Acanthostega and the salamander differ? Why does this difference not prove that one species descended directly from the other?

3 YOUR TURN

Your own words

Imagine scientists find a fossil from about 370 million years ago with an upper arm bone, two lower arm bones, wristlike bones, and three digits on each front appendage. In three sentences, compare it with both fossils in the table and explain one limit of what these comparisons can tell you.

ANSWER KEY

Bones Across Time

GRADE 7 · 7.15

PART 1 · READ AND MARK

Underline the descriptions of front fins and limbs. Number the two fossils from older to younger, then circle one structure that appears in both a fossil and a living animal. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What change in front appendages do the two fossils show over time? Use their dates and bones as evidence.	**Tiktaalik, about 375 million years old, had a fin with wristlike bones but no digits. Acanthostega, about 365 million years old, had a front limb with wrist bones and eight digits.**
2	Which front-limb bones does the living salamander share with both fossils? What does this pattern suggest?	**All three have an upper arm bone, two lower arm bones, and wrist or wristlike bones. Their shared arrangement suggests a shared evolutionary history.**
3	The coelacanth lives today. How does comparing it with Tiktaalik show that an older fin feature still exists?	**Both have fins with internal bones and no digits. The living coelacanth shows that a bony fin without digits still exists.**
4	How do the digits of Acanthostega and the salamander differ? Why does this difference not prove that one species descended directly from the other?	**Acanthostega had eight digits on each front limb, while a salamander has four. The comparison shows a difference in anatomy, not a direct ancestor-descendant relationship.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Like the older Tiktaalik fossil, the new fossil has wristlike bones, but it also has digits. It has fewer digits than the younger Acanthostega fossil, which has eight. These comparisons show differences across time, but they do not prove that the new animal was the direct ancestor of Acanthostega.

Accept comparisons that correctly use the dates and anatomical evidence. Students should not treat any listed species as a proven direct ancestor of another.