Whales in Stone

Use fossil ages and body structures to trace a history of life.

ZOO.1.2 "Describe how fossil records document the history of life on Earth."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each fossil's age, circle the body structures described, and number the fossil animals from oldest to youngest. Use your marks to trace how the evidence for life in water changes over time.

A History Written in Whale Fossils

1. On a rocky shore in Pakistan, a fossil hunter might find the skull of Pakicetus, a mammal that lived about 50 million years ago. Its ear region has structures found in whales, yet its limbs could support it on land. Rock layers preserve fossils from different times, with older undisturbed layers generally below younger ones. Scientists also estimate ages by dating nearby volcanic rocks. An age tells when an animal lived, not whether it was a direct ancestor of another fossil species. Together, age and body structure let researchers place fossil animals into a history of change.

2. About 48 million years ago, Ambulocetus lived near water in what is now Pakistan. Its heavy limbs and flexible spine suggest it could move on land and swim, although scientists debate exactly how it swam. By about 40 million years ago, Basilosaurus lived in the sea. Its streamlined body and small hind limbs show a different balance of traits from those of earlier whale relatives. Both animals had whale-like ear structures. These fossils do not record every generation between land mammals and living whales. They document different combinations of traits in animals from different times.

3. Living whales have flippers, powerful tails, and no external hind limbs. Comparing their skeletons with those of ancient whale relatives helps scientists describe a long shift toward life in water. Yet a fossil record is incomplete: animals must be buried and preserved, and many remains are never found. A sequence of fossils can support a history of change without proving that one named fossil species turned directly into the next. Scientists check that story against fossil ages and shared structures, and they may revise it when new fossils appear.

2 ANSWER WITH EVIDENCE

Use the passage

1. What does the Pakicetus fossil reveal about an early stage in whale history? Use two body structures in your answer.

2. How do the ages and bodies of Ambulocetus and Basilosaurus document a change toward life in water?

3. How do rock layers and volcanic rocks help scientists put fossil animals into a history of life?

4. Why does this fossil sequence support a history of change without proving that Pakicetus was a direct ancestor of Basilosaurus?

3 YOUR TURN

Your own words

Imagine three fossils from a related group of marine fish: a 120-million-year-old fish with a narrow jaw and pointed teeth, a 100-million-year-old fish with a wider jaw and both pointed and flat teeth, and an 80-million-year-old fish with a wide jaw and flat teeth. In four sentences, describe what the sequence suggests about the group's history, cite at least two dated fossils as evidence, and state one conclusion the fossils cannot prove.

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PART 1 · READ AND MARK

Underline each fossil's age, circle the body structures described, and number the fossil animals from oldest to youngest. Use your marks to trace how the evidence for life in water changes over time. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What does the Pakicetus fossil reveal about an early stage in whale history? Use two body structures in your answer.	**Its whale-like ear region links it to whales, while its limbs show it could move on land about 50 million years ago.**
2	How do the ages and bodies of Ambulocetus and Basilosaurus document a change toward life in water?	**Ambulocetus lived about 48 million years ago and had limbs that could move it on land and in water. The later Basilosaurus lived in the sea about 40 million years ago and had a streamlined body and small hind limbs.**
3	How do rock layers and volcanic rocks help scientists put fossil animals into a history of life?	**Older fossils are generally found below younger ones in undisturbed layers, and dating nearby volcanic rocks helps estimate when the animals lived.**
4	Why does this fossil sequence support a history of change without proving that Pakicetus was a direct ancestor of Basilosaurus?	**The dated fossils show different traits at different times, but the record does not preserve every generation or establish direct ancestry between the named species.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

These fossils suggest that jaw width and tooth shape changed in this group over time. The 120-million-year-old fish had a narrow jaw and pointed teeth, while the 100-million-year-old fish had a wider jaw with both pointed and flat teeth. By 80 million years ago, the fossil fish had a wide jaw and flat teeth. The fossils cannot prove that any one of these fish was a direct ancestor of another.

Accept descriptions that use fossil ages and structures to explain change over time. Do not require students to claim that one named fossil species directly descended from another.