Whale Clues Across Time

Use fossils, DNA, and body structures to trace evolutionary relationships.

LS.11.b "the fossil record, genetic information, and anatomical comparisons provide evidence for evolution; and"

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the fossil detail in paragraph 1, circle the DNA detail in paragraph 2, and put a 3 beside the anatomy detail in paragraph 3, then notice how each supports evolution.

Three Clues to Whale Evolution

1. Scientists investigating whale evolution study fossils found in rocks of different ages. Pakicetus, an early whale relative that lived about 50 million years ago, had four legs and feet. Later fossils, including Ambulocetus, show animals with stronger tails and limbs suited for swimming. Still later whale fossils have tiny hind limb bones and flippers. This sequence in dated rock layers shows changes over many generations, connecting land mammals with modern whales rather than a single sudden appearance.

2. Genetic information offers another independent clue. Scientists compare DNA sequences, the order of chemical bases in genes, from living species. Whales and hippos share many DNA sequence similarities, including matching changes that distinguish them from other mammals. These shared changes are unlikely to arise separately in exactly the same places. The comparison supports the idea that whales and hippos inherited DNA from a common ancestor. DNA also shows that whales are more closely related to hippos than to fish, despite their similar swimming lifestyles.

3. Anatomical comparisons examine body structures across species. A whale's flipper contains bones arranged like the arm, wrist, and hand bones of humans, bats, and other mammals. The bones now serve different jobs: grasping, flying, or swimming. Their shared pattern is evidence that these species inherited the structure from an earlier common ancestor. By using fossils, DNA, and anatomy together, scientists build a stronger explanation for evolution than any one evidence source can provide by itself.

2 ANSWER WITH EVIDENCE

Use the passage

1. How do the fossils described in paragraph 1 show a change from land mammals to modern whales?

2. What DNA evidence connects whales and hippos, and what does it suggest?

3. What bone pattern is shared by a whale flipper and other mammal limbs, and what does that pattern indicate?

4. Why does the passage say that fossils, DNA, and anatomy together make a stronger explanation for evolution?

3 YOUR TURN

Your own words

Imagine researchers find a 20-million-year-old coastal mammal fossil with hind legs and broad toes for swimming. Its DNA shares several uncommon sequence changes with seals, and its front limb bones match the basic mammal forelimb pattern. In 4 to 5 sentences, explain how each type of evidence supports evolution and state one conclusion.

ANSWER KEY # Whale Clues Across Time

GRADES 7-8 · LS.11.b

PART 1 · READ AND MARK

Underline the fossil detail in paragraph 1, circle the DNA detail in paragraph 2, and put a 3 beside the anatomy detail in paragraph 3, then notice how each supports evolution. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How do the fossils described in paragraph 1 show a change from land mammals to modern whales?	**Early Pakicetus had four legs and feet. Later fossils show stronger tails and swimming limbs, and later whales have flippers and tiny hind limb bones.**
2	What DNA evidence connects whales and hippos, and what does it suggest?	**They share many DNA sequence similarities, including matching changes. This suggests they inherited DNA from a common ancestor.**
3	What bone pattern is shared by a whale flipper and other mammal limbs, and what does that pattern indicate?	**The flipper has bones arranged like an arm, wrist, and hand. The shared pattern indicates that whales and other mammals inherited the structure from an earlier common ancestor.**
4	Why does the passage say that fossils, DNA, and anatomy together make a stronger explanation for evolution?	**Each source provides evidence for evolutionary relationships and change. Using independent sources together strengthens the explanation more than one source alone.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The fossil has hind legs and broad swimming toes, which may show a stage between land movement and more specialized swimming. Its uncommon shared DNA changes with seals suggest that the animals inherited DNA from a common ancestor. Its front limb bones fit the mammal forelimb pattern, even though the limb may have helped it swim. Together, the evidence supports evolution and suggests a closer relationship to seals than to unrelated swimming animals.

Accept equivalent explanations that correctly connect fossils to change over time, DNA similarities to common ancestry, and shared limb patterns to inherited structures. In the open response, students should use all three evidence types and make a supported evolutionary conclusion.