Whales Through Time

Use fossils and DNA to trace evidence of common descent.

FB.5.3 "Obtain and communicate information to explain how DNA evidence and fossil records support Darwin's theory of evolution."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline fossil details that show change through time, circle the DNA comparison, and write 1 beside the fossil evidence and 2 beside the DNA evidence to track how both support common descent.

How Did Whales Reach the Sea?

1. Imagine finding a whale fossil with ankle bones shaped like those of a land mammal. Modern whales have flippers and no external hind legs, yet their ancestors lived on land. In rocks about 50 million years old, scientists have found Pakicetus, a four-legged mammal with features of the ear region shared by later whales. Fossils of Ambulocetus, from younger rocks, show sturdy limbs that could support movement on land and in water. These finds do not show every generation. Instead, their ages and body structures document changes within the whale lineage over millions of years.

2. By about 40 million years ago, Basilosaurus lived fully in the sea. Its fossils show small hind limbs that could not support walking on land. Compared with Pakicetus and Ambulocetus, this later whale had a body better suited to swimming. The fossil record is incomplete, and no one can say that one named fossil species was the direct parent of another. Still, the sequence in the rocks shows a shift from land movement toward life in water. This pattern supports evolution because descendants can inherit modified traits over many generations, rather than all whale traits appearing at once.

3. DNA offers a separate way to test the same history. Scientists compare matching sections of DNA from living whales, hippos, and other hoofed mammals. Across many sections, whales and hippos share more DNA changes with each other than either shares with deer. That pattern supports a more recent common ancestor for whales and hippos than for whales and deer. Hippos are living relatives, not the ancestors of modern whales. Fossils show when and how whale bodies changed; DNA helps identify relationships among living species. Together, these independent records support Darwin's idea that species descend from common ancestors and change over time.

2 ANSWER WITH EVIDENCE

Use the passage

1. How do the ages and body structures of Pakicetus, Ambulocetus, and Basilosaurus support change over time in the whale lineage?

2. Why do the small hind limbs of Basilosaurus provide stronger evidence for evolution when considered alongside the other fossils?

3. What DNA comparison supports a closer relationship between whales and hippos than between whales and deer, and what relationship does it suggest?

4. How do the fossil record and DNA evidence contribute different information to an explanation of common descent?

3 YOUR TURN

Your own words

A newly found fossil lies in rocks between those of Ambulocetus and Basilosaurus. It has smaller hind limbs than Ambulocetus and a broad tail for swimming. Write four or five sentences for museum visitors explaining how this fossil fits the sequence, how DNA adds support for common descent, and one limit on what the evidence can prove.

Whales Through Time

PART 1 · READ AND MARK

Underline fossil details that show change through time, circle the DNA comparison, and write 1 beside the fossil evidence and 2 beside the DNA evidence to track how both support common descent. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How do the ages and body structures of Pakicetus, Ambulocetus, and Basilosaurus support change over time in the whale lineage?	**The older, four-legged Pakicetus was followed by Ambulocetus, which could move on land and in water. The later Basilosaurus lived fully at sea and had hind limbs too small for walking.**
2	Why do the small hind limbs of Basilosaurus provide stronger evidence for evolution when considered alongside the other fossils?	**Alongside the older fossils with limbs used on land, they show a sequence of changes toward a body suited to life in water.**
3	What DNA comparison supports a closer relationship between whales and hippos than between whales and deer, and what relationship does it suggest?	**Whales and hippos share more DNA changes with each other than either shares with deer. This suggests that whales and hippos share a more recent common ancestor.**
4	How do the fossil record and DNA evidence contribute different information to an explanation of common descent?	**Fossils show changes in whale bodies over time. DNA comparisons reveal relationships among living species, including the close relationship between whales and hippos.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

This new fossil fits between Ambulocetus and Basilosaurus in age and has smaller hind limbs than Ambulocetus. Its broad tail suggests a body suited to swimming. The fossil sequence supports a shift from land movement toward life in water over many generations. DNA adds independent support for common descent because whales share more DNA changes with hippos than with deer. These clues cannot prove that the new fossil species was a direct ancestor of modern whales.

Accept explanations that connect fossil age and structure to change over time and use the DNA comparison to infer common ancestry. Do not accept claims that hippos are whale ancestors or that a fossil proves direct ancestry.