

Fish or Mammals?

Evidence organizer

Guiding question

What does evidence from anatomy, fossils, embryos, and DNA reveal about the closest living relative of cetaceans?

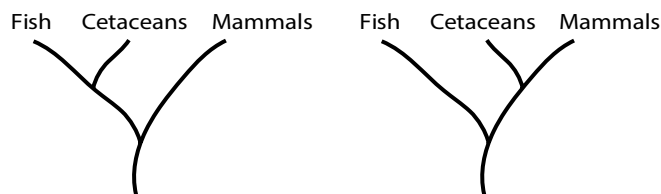
Instructions

Use this Evidence Organizer with the Fish or Mammals? Case Study document.

Evidence from Anatomy

Use the table on page 2 to answer the questions:

1. How many anatomical characteristics do Cetaceans share with Mammals?
2. How many anatomical characteristics do Cetaceans share with Fish?
3. Circle the tree diagram that best shows the relationship between fish, cetaceans, and mammals. Explain your answer.



Evidence from Fossils

Use the information on pages 3-5 to answer the questions:

4. Summarize how the fossil cetacean ancestors changed over time. Give at least one example of a specific trait and how it changed.

NAME _____ DATE _____

5. Does the fossil evidence support or refute the claim that cetaceans evolved through change over time from an ancestral mammal that lived on land? Explain your answer.

6. Look at the ankle bones at the top of page 6. Which group of modern-day land mammals has ankle bones that are most similar to those of the fossil whales?

Evidence from Embryos

Look at the information on the bottom of page 6.

7. What does nostril position say about the ancestry of dolphins and other cetaceans?

8. What does hindlimb shape say about the ancestry of dolphins and other cetaceans?

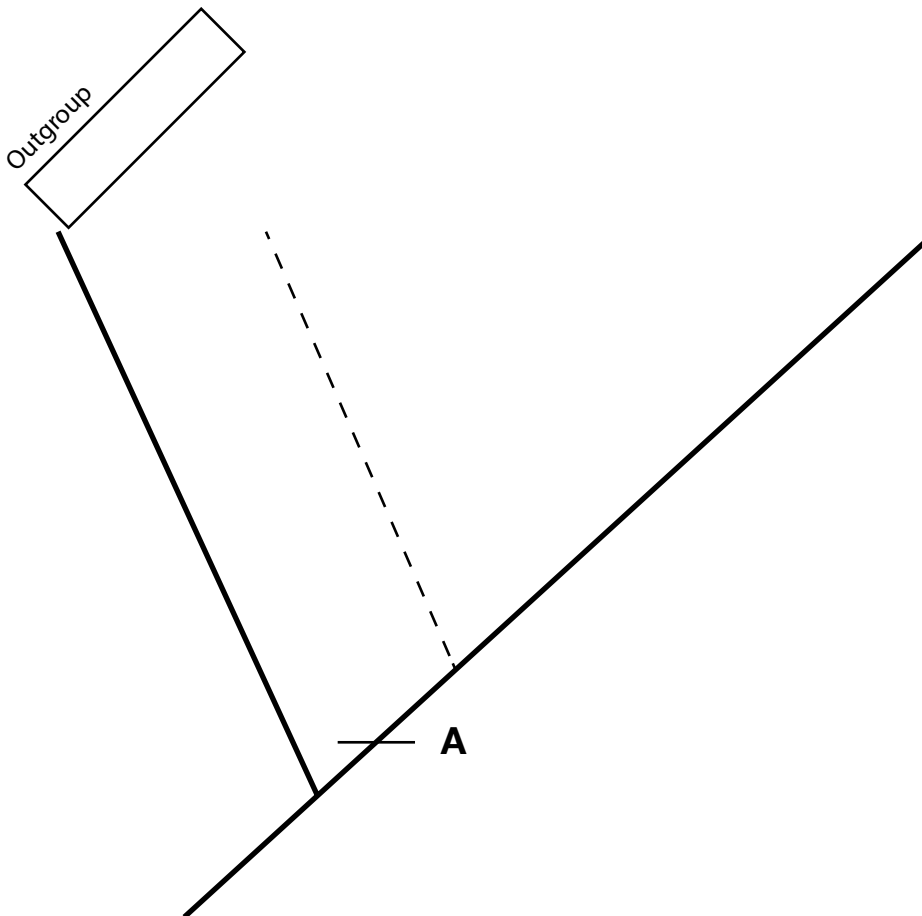
DNA Evidence

9. (Use the data table on page 7) Which animal makes casein protein that is MOST similar to the whale protein? What does this suggest about this animal's relationship to whales?

10. Use the data table on page 8 to fill in the even-toed ungulates on tree

- a. Find the animal with the fewest traits (in this case, the fewest transposons) in common with the others. Write the name in the box labeled 'outgroup.'
- b. Find the animal with the next-fewest traits in common with the others. Add a new branch to your tree (follow the dashed line). Write the name of the animal at the top of the new line.
- c. Follow the pattern, adding branches for the other animals.
- d. Mark the tree to show where each transposon first appeared (A has been marked for you).

Even-toed Ungulate Tree



NAME _____ DATE _____

Summary

11. Which living animal is most closely related to (shares a most common ancestor with) Cetaceans such as whales?

12. From the early 1700s to the modern day, how did various lines of evidence refine scientists' understanding about the ancestry of Cetaceans?

a. Anatomy

b. Fossils

c. Embryological development

d. DNA (including amino acid sequences)