

Fish or Mammals? Argumentation

Background

You have seen several lines of evidence that scientists have used to understand where cetaceans fit on the animal family tree. In the practice of scientific argumentation, pieces of evidence are used to support claims. Reasoning is the logical thinking and science ideas that connect claims and evidence.

Instructions

You will need the following handouts:

- Fish or Mammals? Case study
- Fish or Mammals? Evidence organizer

Using the handouts, find the evidence that connects each claim to the reasoning, and add it to the table. Keep in mind that a well-substantiated claim may later become evidence or reasoning for another claim.

For Type of Evidence, fill in whether it is from anatomy (A), embryological development (E), fossils (F), or DNA (D). (Amino acid sequences, because they are coded in DNA, are DNA evidence.)

In some cases, there are multiple types of supporting evidence.

CLAIM	Type of Evidence	EVIDENCE (fill in)	REASONING
<p>1. Cetaceans share a more recent common ancestor with land mammals than they do with fish.</p>			<p>More closely related species tend to have more characteristics in common.</p> <p>When two organisms share traits, scientists usually assume that they inherited the traits from a common ancestor, rather than that they evolved the traits independently and identically.</p>
<p>2. Cetaceans are the descendants of an ancestral mammal that lived on land.</p>			<p>Through gradual change over time, across many traits, and across the span of many generations, species often come to look very different from their distant ancestors.</p> <p>As embryos, organisms often have ancestral traits that they lack as adults.</p>

CLAIM	Type of Evidence	EVIDENCE (fill in)	REASONING
3. Cetaceans share a more-recent common ancestor with even-toed ungulates than with other groups of land mammals.			Species can both gain and lose traits over time. Lost traits can be preserved in ancestral fossils, and also in living species that share a common ancestor that had those traits.
4. Cetaceans' closest living relative is the hippopotamus.			Because DNA tends to be most similar among more-closely related organisms, similarities in DNA and amino acid sequences (which are coded for in DNA) can be used to understand evolutionary relationships.

Question

Do you think the lines of evidence from anatomy, embryology, fossils, and DNA lead to similar conclusions? Why or why not?