

WHALE ANCESTRY: DNA Activity

The plot thickens. We have narrowed the search for the origin of whales to a close connection with Artiodactyls. The next question is: which one of the diverse members of that group are whales *most* closely aligned?

DNA to the rescue! As we learn the DNA sequences of more and more organisms, we can compare corresponding sequences to see which living species have DNA that is most alike. As the DNA for a particular gene is inherited by new descendent species, and time passes, mutations can occur (replacements of former DNA bases by different bases), many without any significant effect. The more time that has passed (the more distant the ancestry), the more mutations will have occurred, and the more differences we will find.

You will be provided with eleven DNA segments from the gene for beta-casein, a milk protein found in all mammals. The segment is 60 base pairs (bp) long, from bp 141 to bp 200 in the gene. That same corresponding segment is presented for 11 species, including 3 Cetaceans: Right Whale, Sperm Whale, and a Porpoise; 7 Artiodactyls: a Giraffe, a Hippo, a Cow, a Camel, a Deer, Domestic Pig, and a Peccary; and one Perissodactyl: the Indian Rhino. The Rhino serves as a basis for comparison as an “outgroup.”

PROCEDURE:

1. Align the DNA segments from two species, and count the number of loci where the bases differ. For each pair of species compared, place the number of differences in the proper space on the grid below.
2. Each team (OF 3-4) should do at least the following (compare with each other):
 - A. two of the cetaceans (Right Whale, Sperm Whale, or Porpoise)
 - B. Hippo
 - C. Giraffe
 - D. at least two of the Artiodactyls. If there are at least 3 teams in the class, each team should compare different pairs of Artiodactyls, e.g.: Cow & Giraffe, Camel & Deer, and Pig & Peccary.
 - E. Rhino

RESULTS:

S.Whale										
Porpoise										
Giraffe										
Hippo										
Cow										
Camel										
Deer										
Pig										
Peccary										
Rhino										
	R.Whale	S.Whale	Porpoise	Giraffe	Hippo	Cow	Camel	Deer	Pig	Peccary

DISCUSSION: Continue with the guided discussion on following page.