CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Isabella A. Smith

Project Number
J0522

Project Title
Tracing the Footprints: Exploring Whale DNA

Abstract

Objectives/Goals
The purpose of my experiment was to determine the closest terrestrial tetrapod relative of a modern blue whale (Balaenoptera musculus).

Methods/Materials
For this project, the required materials were a log book, and a computer with high speed internet. The query sequnce and gi (genome information) number were obtained from a database known as GenBank. The information was then programmed into a second database called Blast. Several codes and modifications were added/made to the query, which was submitted to create a list of organisms. The organisms were 70% identical or more to the specific blue whale protein, cytochrome c oxidase, that I selected and submitted. I took the 90th and 80th percentile of the organisms and created a cladogram stemming from the common ancestor that gave rise to the whale. I decoded the Latin names and noted taxonomy for these organisms in my log book. I determined the habitat and body plans of these animals and compared them to the blue whales.

Results
The closest terrestrial tetrapod to the blue whale was the hippopotamus at 97% identical protein sequence to the blue whale. Other interesting results included several types of deer, dolphins, penguins, water buffalos, sheep, bears, and even flying foxes. I mapped my results as a large cladogram. In general, the animals are attracted to water, have a lot of thick fat, and are larger than average, traits also seen in a blue whale.

Conclusions/Discussion
Specifically, to prevent any misinterpretation I used mitochondrial proteins, whose genes do not recombine. This would prevent any genetic events from interfering with my results. I observed my tree for a very long time and there were many interesting phyla there. I was extremely satisfied with my experiment. My hypothesis was correct; the hippopotamus is the blue whale#s closest tetra pod relative. If I redid the experiment, I would get the same results unless I changed the search query or the tree map format. There can only be differences with the change of one of the two things above, or if the whales mutate/evolve. When I tested my hypothesis I used genome databases. I have learned about the blue whale#s evolution and that it is closely related to many animals you might not expect.

Summary Statement
My project was about the evolution of whales and its closest relatives.

Help Received
My mother and Stepfather helped purchase supplies. Miss Woodruff, my teacher's assistant, helped me paste things on the display board.