



PROJECT OCEANOLOGY



Tree of Life

Overview

In this hands-on exercise, students closely observe a diverse set of marine organisms and then work together in small groups to construct models (phylogenetic trees) that predict evolutionary relationships between the organisms.

Tree of Life Lesson: Protocol & Teaching Notes

Engage: Tree of Life slideshow/quiz with discussion.

- *Show of hands – which is most closely related? How did they know?*
- *Students likely looked for similarities and assumed that similar organisms were more closely related. Is this always/often a safe assumption?*
- *Students likely made judgments about which traits were most important. Some traits are more informative than others?*

Explore:

1. Critter bins – students circulate in small groups, checking out the organisms and taking notes on key structures, behaviors, etc.
2. Meet in small groups to brainstorm a list of characters that they think will be important for classifying the organisms. *Go over the definition of character, discuss what makes a good character.*
3. Fill in the character matrix table on the worksheet.
Walk around the room helping students with this.

Explain: Brief lecture on phylogenetic trees and tree thinking. Phylogenetic trees as hypotheses for evolution, outgroups, evolutionary relatedness, shared ancestors, how to map traits (categories of characters) onto trees. Go through a food phylogeny example slide show and discuss which types of characters are most useful for learning about relatedness (e.g. permanent traits, not subjective).

Elaborate: Students may want to revise their character matrix using what they have just learned, so allow time for this. Next, students should use their character matrix tables to build a phylogenetic tree of the organisms they observed. Draw trees on board or on large sheets of paper.

Emphasize that they are building models- these are hypotheses about evolution

Evaluate: Students present their trees to each other. Discussion of similarities/differences between trees, and why.

Were there any commonalities? Can they come to consensus?

How can scientists working with the same set of organisms come up with different phylogenetic trees?



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Optional Post-Lab Assignments

Tree of Life Homework sheet

Example phylogeny with set of questions designed to reinforce major concepts

Build an Ancestor

Students pick a node on their phylogeny, and use their new phylogenetic tree skills to predict what traits (categories of characters) might be present in the common ancestor at that node. Students draw a picture of the hypothetical ancestor, labeling the relevant traits.