



# 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.

### Performance Expectations (High School)

**HS-LS4-1** Communicates scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. *This lesson focuses on homology as evidence of common ancestry and biological evolution.*

### Science and Engineering Practices

**Obtaining, Evaluating, and Communicating Information:** Communicate scientific information (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). *Students will apply scientific ideas about evolution to construct an explanation for the similarities and differences that they observe between organisms. Students will present and defend their models (phylogenetic trees), using scientific evidence to support their hypotheses.*

**Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena:** A scientific theory is a substantiated explanation of some aspect of the natural world, based on a body of facts that have been repeatedly confirmed through observation and experiment and the science community validates each theory before it is accepted. If new evidence is discovered that the theory does not accommodate, the theory is generally modified in light of this new evidence. *Students will construct models (phylogenetic trees) that predict evolutionary relationships between the organisms.*

### Crosscutting Concepts

**Patterns:** Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena. *Students will identify patterns of similarity and difference, and relate those patterns to evolutionary history.*



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## Disciplinary Core Ideas

**LS4.A Evidence of common ancestry and diversity:** Genetic information, like the fossil record, provides evidence of evolution. DNA sequences vary among species, but there are many overlaps; in fact, the ongoing branching that produces multiple lines of descent can be inferred by comparing the DNA sequences of different organisms. Such information is also derivable from the similarities and differences in amino acid sequences and from anatomical and embryological evidence. *This lesson focuses on how we can use traits of living organisms to develop hypotheses about their evolutionary histories.*