Lab: The Great Plankton Race

(modified from University of Arizona)

Background Information

The word plankton is from the Greek word for "wandering". They drift or wander the oceans at the mercy of the currents. Plankton are generally unable to move against currents. This lack of mobility is what separates plankton from nekton, which are organisms that can propel themselves through the water. Some planktonic organisms can be quite large (like jellyfish), however, most are small enough that they must be viewed under a microscope. The plankton that photosynthesize are called phytoplankton. Plankton that eat other plankton are called zooplankton.

All Plankton must avoid sinking. Phytoplankton need sunlight for photosynthesis, so they must stay within the photic zone (the top 200m). Zooplankton depend on phytoplankton and other zooplankton for food, so they must avoid sinking as well. Plankton avoid sinking by increasing their surface area and/or decreasing their density. Flattened bodies and appendages, spines, and other body projections slow sinking by adding surface area without increasing density. Some plankton resist sinking by forming chains. The use of low-density substances like oil or fat helps increase buoyancy and can serve as food reserves.

While plankton are too weak to swim against a current, many do swim relatively large distances *vertically* each day. Great numbers of zooplankton commute up to the surface at night and back down each day. Migrating plankton can take advantage of greater densities of food near the surface at night when they cannot easily be seen by predators.

Activity

Construct a model plankton using your choice of the materials provided. Your goal is to produce a creature as close to neutrally buoyant as possible. Your plankton will race with other students, and the slowest plankton to sink to the bottom is the winner. Floating plankton will be disqualified. The model should be roughly the size of a golf ball.

Evaluation

1. Why would plankton want to go up in the water column?
2. Why would plankton want to go down in the water column?
3. If plankton cannot swim against the current, how do they move within the water column?
4. Draw a picture of your plankton model.
5. Describe its features and how well it slowly sank.
6. Allow your plankton to practice the race three times. Record your time trails below.

Trial 1 (sec)	**Trial 2** (sec)	**Trial 3** (sec)	**Avg. Time** (sec)	**Distance** (cm)	**Rate** ($^{cm}/_{sec}$)

7. How did your plankton compare to others in the class?
8. Describe the features of the winning plankton. How was it different/similar to yours?
9. Describe the features of the losing plankton. How was it different/similar to yours?
10. This race was performed in freshwater. How would the performance of your plankton be different in saltwater? Why?
11. This race was performed in room temperature water. How would the performance of your plankton be different in very cold water? In very hot water? Why?
12. What factors, other than buoyancy, influence the evolution of plankton's external features?