NMEA Anchorage, Alaska

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Productive Plankton

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Dauphin Island Sea Lab

***Grade Level*:** K-12(can be adapted for all ages)

***Lesson Groupings*:** Individual & Small Groups

Time Required: 50 minutes

State Standards

I. Course of Study ALCOS (Alabama Course of Study)**:**

1st Grade, Life Science, Content Standard 4
Describe survival traits of living things, including color, shape, size, texture, and covering.
4th Grade, Life Science, Content Standard 5
Describe the interdependence of plants and animals.
5th Grade, Life Science, Content Standard 9
Describe the relationship of populations within a habitat to various communities and ecosystems.
7th Grade, Life Science, Content Standard 7
Describe biotic and abiotic factors in the environment.
9th-12th Grade, Biology Core, Content Standard 13
Trace the flow of energy as it decreases through the trophic levels from producers to the quaternary level in food chains, food webs, and energy pyramids.
9th-12th Grade, Marine Science Elective Core, Content Standard 7
Identify patterns and interrelationships among producers, consumers, scavengers, and decomposers in a marine ecosystem.
9th-12th Grade, Marine Science Elective Core, Content Standard 9
Arrange various forms of marine life from most simple to most complex.

National Science Education Standards:

Life Science E.C.1 Characteristics of Organisms
Life Science E.C.2 Life Cycles of Organisms
Life Science M.C.2 Reproduction and Heredity
Life Science M.C.5 Diversity and adaptations of organisms
Life Science H.C.6 Behavior of organisms

Ocean Literacy:
Essential Principle 5: The ocean supports a great diversity of life and ecosystems.

II. Concepts:

Plankton misconception # 1: All Plankton are tiny. Plankton Fact: Not all plankton are tiny; i.e. the jellyfish. A Plankton is any living organism that is a weak or non-swimmer and drifts in a body of water; freshwater or saltwater.

Plankton misconception #2: Plankton are animals. Plankton Fact: Plankton can be plants or animals. Plankton that are characterized as plants, meaning they are photosynthetic, are known as ***phytoplankton***. These "plants" are responsible for the removal of most of the CO_2 found in our atmosphere, and provide O_2 to the water as well as atmosphere. Plankton that are animals are called ***zooplankton.*** Zooplankton can be divided into two groups. There are zooplankton that spend their whole lives as plankton, ***holoplankton***, such as most copepods**.** There are also plankton that spend only a part of their lives as plankton, ***meroplankton***, such as a fish.

Plankton are one of the most important types of organisms found in the ocean. They are at the bottom of the food chain. If these little guys disappear, everything else above them disappears (imagine the game Jenga). The plankton population size can affect other populations of marine life. Plankton bloom according to available food and nutrient sources.

One particular zooplankton that is misunderstood is gelatinous plankton, also known as "jellyfish." "Jellyfish" can be two very different animals from two different phyla; Cnidaria or Ctenophora. Primary identifying characteristics of Phylum Cnidaria are the stinging cells known as cnidae or nematocysts. Examples of the animals found in this phylum would be the stinging jellies , anemones, and coral. The primary identifying characteristics of animals in the Phylum Ctenophora are the presents of ctenes or comb rows. These animals are known as comb jellies or sea snot. Instead of having stinging cells, cnidae, the ctenophores have colloblasts, tentacles covered with adhesive granules of lipid. Another major distinguishing characteristic is the complete gastrovascular cavity of the ctenophore and the incomplete gastrovascular cavity of the cnidarian.

When looking at some of the similarities of both types of jellies, we find they both have diploblastic metazoan, meaning they have two cellular layers; an endoderm and an ectoderm. Both jellies lack specialized organ-level organization and as well as cephalization. Both are radially symmetrical; ctenophores are biradially symmetrical and cnidarians have primary radial symmetry (biradial and quadriradial). Cnidarians and Ctenophores are both carnivorous and feed on zooplankton.

III. Behavioral Objectives:

TSWBAT:

List the differences in "jellyfish" to place the animals in their separate phyla Ctenophora and Cnidaria.

Define the following: Plankton, Zooplankton, Phytoplankton, Meroplankton, Holoplankton, and Food Web.

Describe the feeding apparatus of the ctenophore and the cnidarian.

Draw and label an Ocean Food Web.

IV. Materials

Plankton pictures (found at the end of lesson plan)

Velcro

Party Blowers

Computer/powerpoint

V. Teaching/Learning Procedures/Instructional Procedures

Before the lesson: Print the pictures and laminate. Cut the pictures into squares and place a piece of Velcro on the back of the pictures. Use the same side of Velcro for all pictures. Take the party blowers and stretch out the paper blower. On the end place the opposite side of the Velcro so it will pick up the plankton.

Lecture: Discuss Plankton, Zooplankton, Phytoplankton, Meroplankton, Holoplankton, Ocean Food Web. Bring up the misconceptions of Plankton and about "Jellies". Discuss the differences of these two groups of "Jellies," especially the feeding appendages.

Lab: Spread all the plankton picture side down, Velcro side up, on the tables. Grouping some zooplankton as blooms and spreading others out. The jellies next to blooms will catch more, grow bigger and have more successful reproductive rate. Give each student their own party blower. Label students as a Cnidarian or a Ctenophore. Which feeding structure will they have and how does it work? Students will be placed around the room and timed "feeding". The students can compare how well they did if placed near a bloom or not. Discuss the causes of a bloom(food availability, seasonal.) Now look at the type of plankton they caught; use the plankton list to figure out what each student caught. Have students list their catch. Did they catch something that is not a food item; i.e. a ctenophore catching a Portuguese Man-of-War?

Evaluation: Students should complete their lab sheet or create an entry into their Science Notebook.

VI. References:

Dauphin Island Sea Lab, AL

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http://faculty.washington.edu/cemills/Ctenophores.html

VII. Adaptations: Create specific feeders by using different sides of Velcro or use magnets on some of the plankton and the party blowers. Have students create a graph of food caught vs. time feeding.

What am I? Ctenophore or Cnidarian

Give each student their own party blower.

Label students as a Cnidarian or a Ctenophore.

_____

Which feeding structure do you have and how does it work?

_____
_____
_____
_____

Students will be placed around the room and timed "feeding".

How well did you do feeding? How many plankton did you catch?_____
Were you placed near a bloom? Discuss the causes of a bloom.

_____
_____
_____
_____

Now look at the type of plankton you caught; use the plankton list to figure out what you caught. List your catch.

_____
_____
_____
_____

Did you catch something that is not a food item, i.e. a Ctenophore catching a Portuguese Man-of-War?

_____
_____
_____
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