PLANKTON IDENTIFICATION

OVERVIEW

Students will use microscopes to observe and identify phytoplankton and zooplankton.

CONCEPTS

- *Plankton* are the mostly microscopic plants and animals that drift in the currents.
- Plant plankton is called "*phytoplankton*," while animal plankton is called "*zooplankton*."
- Plankton form the basis of life in the sea.

MATERIALS

- Compound microscope
- Dissecting microscope
- Plankton sample (see preparation)
- Petri dish
- Microscope slides
- Eye dropper
- Plankton Identification Chart

PREPARATION

Plankton samples may be obtained in several different ways. If you live near the ocean, you may have your students make plankton nets (see *Building a Plankton Net* activity) and then tow them from either a boat or a dock. If you live far from the ocean, it is possible to order preserved samples from a science supply store, for example Carolina Biological Supply Company (1-800-334-5511) or Ward's (1-800-962-2660). Or you can access the *image of a plankton sample* found on this CD-ROM. If you collect plankton and wish to use it for several days, you can preserve it in a 3 - 5% formalin solution.

Make copies of any laboratory materials that you will need. If possible, have the students work in teams of two. Before you begin, review with your students the care and use of microscopes.

PROCEDURE

Engagement

When you look at a drop of seawater, it seems to be clear. However, when you put the drop of water under a microscope, you will see that the water is teeming with life. Nearly every creature in the sea spends either part or all of its life drifting in the ocean. Plankton are the plants and animals that drift along in the currents and are often microscopic in size. In this exercise, you will have an opportunity to examine and identify plankton.

Activity

1. Use an eye dropper to collect a few drops of the sample and place in a petri dish. Observe the sample with a dissecting microscope. Since the plankton can move up and down in the drop, you will need to refocus your microscope to see plankton at different levels.

2. Many of the organisms are too small to be seen with the dissecting microscope. You can prepare a slide of the sample and observe it under a compound scope with low and high power objectives. Make sure that you save all of the sample.
3. To prepare the students to distinguish different plankton types, you may wish to discuss how to differentiate ocean plants from animals. Will they have different colors? Structure? Behavior? You may want to alert them that distinguishing characteristics for land-based plants and animals are usually much different than those for plankton.
4. Observe your sample for the following:
   a. most abundant organisms
   b. variations in shape, color, and swimming ability
   c. types of appendages seen on various plankton
   d. eggs
   e. *larval* and juvenile forms of *crustaceans* and fish
5. Select the most common organisms from your sample. Record the following information on your data sheet:
   a. a detailed drawing of the specimen
   b. identification of your specimen using the Plankton Identification Chart
6. Repeat this procedure with as many different organisms as time permits. Make sure that you have at least:
   a. two different kinds of phytoplankton (plants)
   b. four different kinds of zooplankton (animals)
   c. one diatom, one dinoflagellate, and one form of permanent zooplankton

Explanation

Plankton are the plants and animals that drift around on the oceans' currents. They are abundant in the surface waters where sunlight and nutrients are readily available. Phytoplankton are the microscopic plants that convert sunlight and nutrients to starch and organic matter. Not only do phytoplankton form the base of the oceans' *food chain*, they also produce at least 80% of the oxygen that we breathe.

Among the animal plankton (zooplankton), common are eggs, *larvae*, and juvenile forms of *invertebrates* and fishes. *Copepods* (related to crabs and shrimp) are the most abundant and widely distributed zooplankton.

All forms of life in the ocean depend either directly or indirectly upon plankton for food. Phytoplankton supports most of the *herbivores* of the sea. As the oceans' primary *producer*, phytoplankton trap and store the energy contained in sunlight. In the process of *photosynthesis*, the phytoplankton use carbon dioxide and water to produce food. Because they need sunlight to photosynthesize, phytoplankton are generally found near the surface of the ocean. Some scientists calculate that without the oxygen production of phytoplankton, life as we know it would not exist. This is because phytoplankton produce oxygen in proportion to the amount of carbon dioxide that they use.

EXTENSION

Nearly all phytoplankton species, the ocean's primary producers, are used by zooplankton (copepods) and small invertebrate filter feeders (mussels and clams) as food. These filter feeders are fed upon by larger invertebrates and fish. All of the animals that consume, either directly or indirectly, the food that producers have stored are called *consumers*. To help us to understand this relationship, we can draw a food chain. A simple food chain might show us that a fish ate the zooplankton which ate the

phytoplankton. Draw and label several different food chains. How many of your diagrams begin with phytoplankton?

The concentration of plankton is influenced by the ocean's motion. Research how and why currents and upwelling affect plankton population. Is there a strong connection between "ocean motion features" (i.e., currents, upwelling) and fisheries?

Links to Related CD Activities, Images, and Movies

Image of *Plankton from the California coast during a plankton bloom*
Movie of *Plankton net from research vessel Sea Explorer*
Activity *Building a Plankton Net*
Activity *Oxygen, Carbon Dioxide, and Life*

Vocabulary

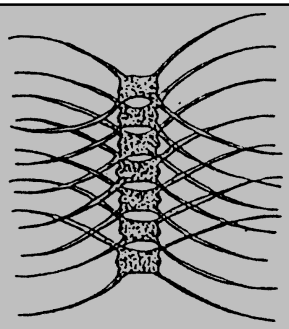
consumer	*copepods*	*crustaceans*
food chain	*herbivore*	*invertebrate*
larva	*nutrients*	*photosynthesis*
phytoplankton	*plankton*	*producer*
upwelling	*zooplankton*	

Source

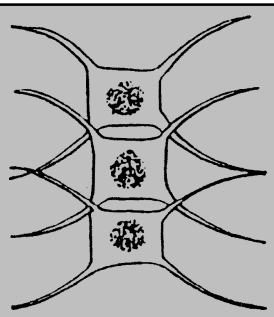
Adapted from Kolb, James A., Project Director. *Marine Biology and Oceanography Grades 9 - 12.* Marine Science Project: FOR SEA. Marine Science Center. Poulsbo, WA. 1986.

PHYTOPLANKTON

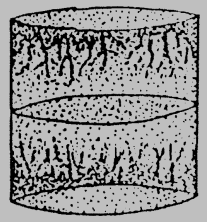
Diatoms



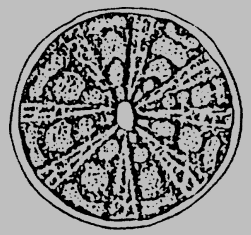
Choaetoceros



Choaetoceros

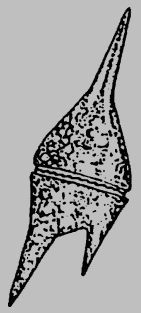


Coscinodiscus

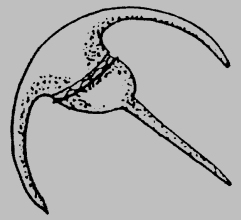


Coscinodiscus

Dinoflagellates

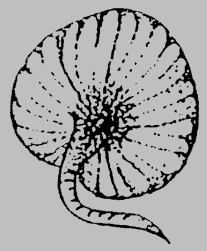


Ceratium



Ceratium

Coscinodiscus

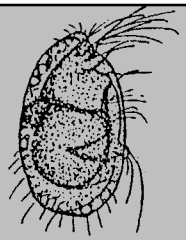


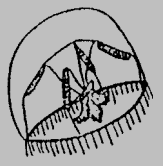
Coscinodiscus

Zooplankton Permanent


Arrow Worm Sagitta


Cladocera


Ostracod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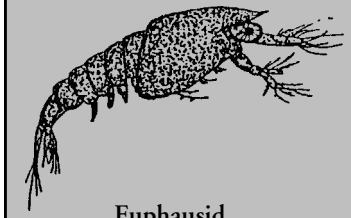
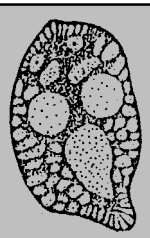
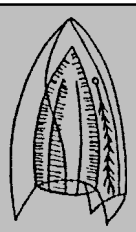
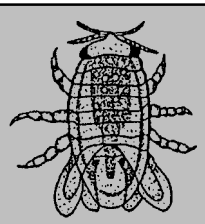
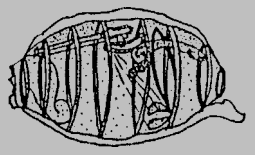

Euphausid

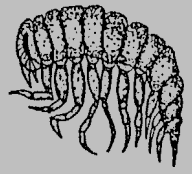

Flatworm


Siphonophora

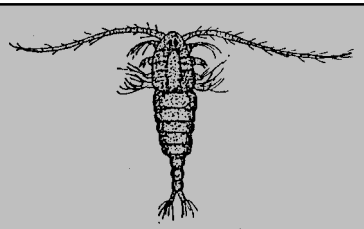

Oikopleura (Tunicata)

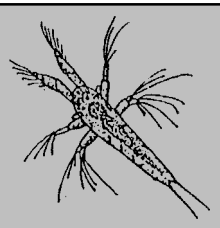

Isopod


Doliolum

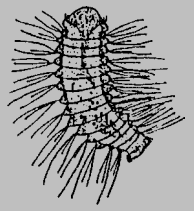

Amphipod

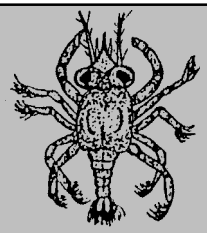

Copepod (Side View)

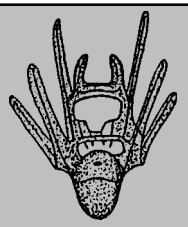

Copepod (Side View)

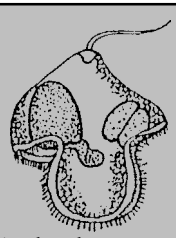

Copepod Larva

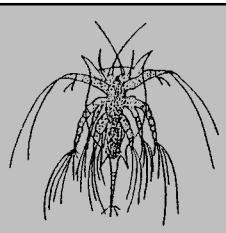
Zooplankton Temporary

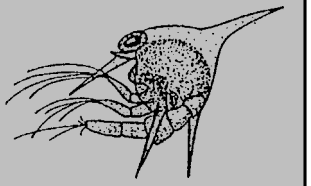

Polychaete Worm

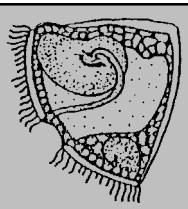

Megalops Larva of Crab

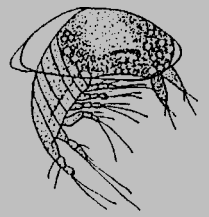

Sea Urchin Larva

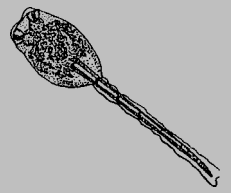

Trochophore Larva

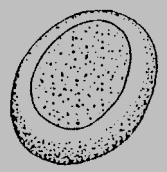

Nauplius Larva of Barnacle

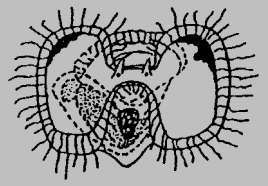

Zoea Larva of Crab


Bryozoa Larva


Cypris Larva of Barnacle


Tunicate Larva


Fish Egg


Veliger Larva of Gastropod