Ocean 11

Plankton

Sunlight penetrates to a depth of 1,000 feet. About ninety percent (90%) of the ocean is more than 1,000 feet deep, therefore most of the ocean is in complete darkness 24 hours a day.

Plant Life in the Oceans

Concepts:
1) The major constituents of the ocean are phytoplankton.
2) The larger algae, the seaweeds, are biologically and economically important.

The majority of sea life is plankton. The phytoplanktons make up algae and bacteria. These small plant organisms are the feed for a wide variety of species, such as: animal plankton, small fish and part of the diet for penguins, seals and whales. Certain species of algae are known as seaweed. They all contain chlorophyll. Seaweeds are food for man, as well. They are also an important source of oxygen. Sea lettuce has the appearance of lettuce and can be prepared for food. The fan kelp is a brown algae with many leaf-like segments growing from the end of a stalk. This species is rich in iodine and other minerals. It is popular in Japan. Most impressive, are the giant kelp off the Pacific coast. These giant kelp can reach 500 metres. Small air bladders at the base of the leaves, serve to give buoyancy to the plant. The giant kelp is harvested commercially. Seaweeds are large, marine algae that are used as food for humans and animals, as fertilizer for agriculture, as a source of medicine and as an ingredient in many industrial products.

Marine life can be divided into three categories based on lifestyles:

Organisms that live in or on the bottom, such as seaweed or crabs, are called the *benthos*.

Strong-swimming animals that live in the open water, such as squid, whales and adult fish, are called the *nekton*.

Plankton are small floating or feebly-swimming plants and animals in the water.

Plankton may be primitive unicellular plants and animals. All types of plankton are at the mercy of the waves, tides, and currents for transportation.

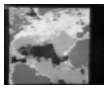
Most of the organic matter in the sea is plankton, and directly or indirectly, nearly all other marine creatures depend on it as a source of food.

Plant plankton (phytoplankton) need to be near the surface, where light is available for photosynthesis. Most animal plankton (zooplankton) need to be near the surface to feed upon the phytoplankton.

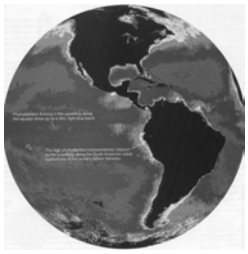
In order to stay afloat near the surface, plankton have evolved many ways to control their position in the sea. Spikes and other projections on a plankton help to distribute the organism's weight over a large surface area, slowing its sinking. Oil is lighter than water. Many organisms, such as copepods and diatoms, produce oil to help them float. Air-filled floats help many types of marine zooplankton, such as the Portuguese man-o-war, stay afloat.

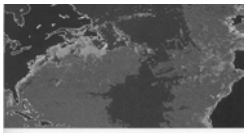
Questions: Plankton

1. What is the benthos?
2. What are three organisms that live in the benthos?
3. What is the nekton?
4. What are three organisms that live in the nekton?
5. Define the term "plankton".
6. What is the basic food source for all life in the ocean?
7. Why do phytoplankton need to be close to the surface?
8. Describe three ways plankton control their position?
9. Are all plankton microscopic?

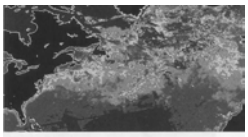


Measuring the concentration of chlorophyll in ocean water by satellite. This false-color image from the Coastal Zone Color Scanner aboard the satellite Nimbus 7 represents average conditions over several years. It shows the concentration of chlorophyll in the upper layer of the ocean, with higher amounts indicated by green, orange, and red. Note the high phytoplankton concentrations induced by increased nutrient availability along the coasts and the thin, light blue band representing upwelling and productivity along the equator west of South America. The centers of the oceanic gyres contain relatively few phytoplankton, as shown by their purple hue.

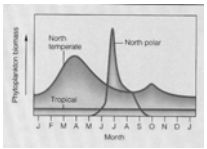


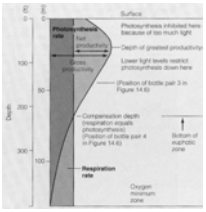


a Photosynthetic activity in winter. (In this color-enhanced image, red-orange shows where chlorophyll concentrations are greatest.)

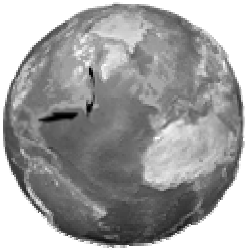


b Photosynthetic activity in spring.





Continental Shelves



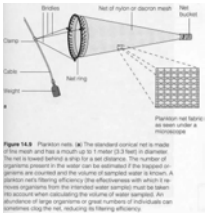
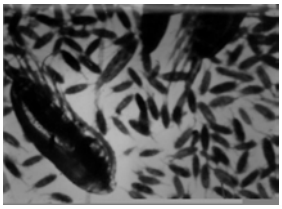


Figure 14.5 Plankton nets. (**a**) The standard conical net is made of this mesh and has a mouth up to 1 meter (3.3 feet) in diameter. The net is towed behind a ship for a set distance. The number of organisms present in the water can be estimated if the trapped organisms are counted and the volume of sampled water is known. A plankton net's filtering efficiency (the effectiveness with which it removes organisms from the intended water sample) must be taken into account when calculating the volume of water sampled. An abundance of large organisms or great numbers of individuals can sometimes clog the net, reducing its filtering efficiency.

Copepods

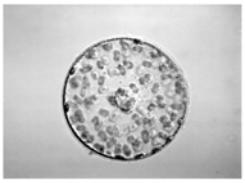


A copepod genus. Calanus, approximately named after a mythical East Indian wanderer. It is perhaps the most abundant and widely distributed copepod genus. The species shown here reaches a maximum size of about 0.5 millimeter (about 0.02 inch).

Copepod

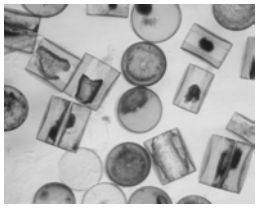
Oar / Foot

Diatom

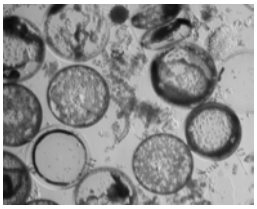


Coscinodiscus sp. (100 µm diameter).
Coscinodiscus (100 µm de diamètre).

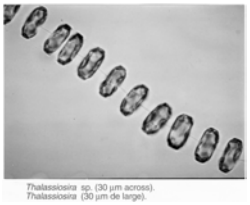
Diatoms



Diatoms

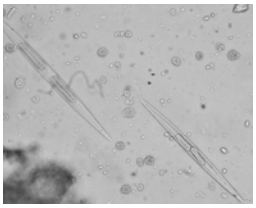


Diatom Chain

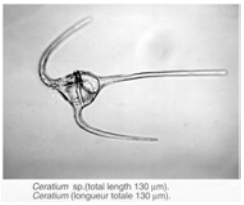


Thalassiosira sp. (30 µm across).
Thalassiosira (30 µm de large).

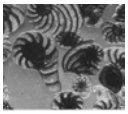
Toxic Diatoms

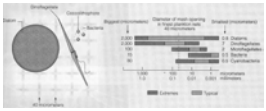


Dinoflagellate

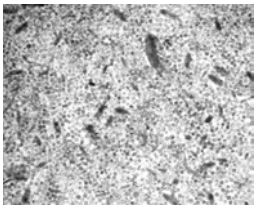


Ceratium sp.(total length 130 µm).
Ceratium (longueur totale 130 µm).



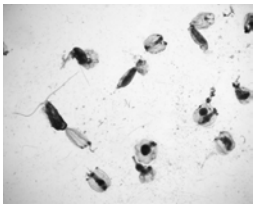


HAPPY COPEPODS

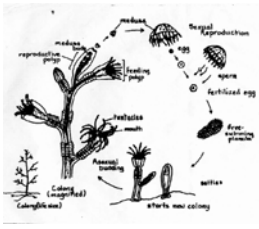


Jellyfish

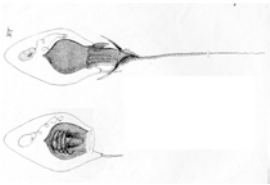
Jellyfish and Copepods



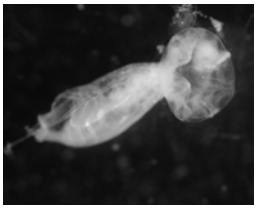
Jellyfish Lifecycle



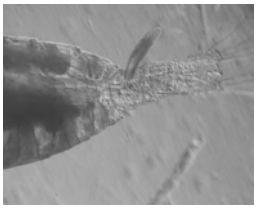
Nematocyst



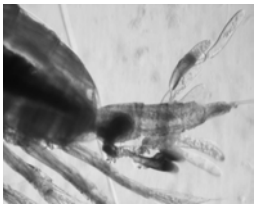
Copepod in Jellyfish

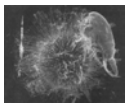


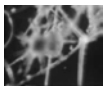
SPERMATOPHORE

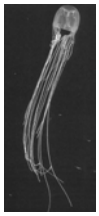


Spermatophores







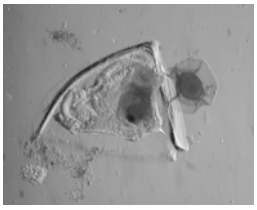


A sea wasp (*Chironix*), one of the most dangerous jellyfish. An inhabitant of tropical waters from Africa to northeastern Australia, it can kill a human within 3 minutes. The tentacles of a large specimen can be 15 meters (50 feet) long. *Chironix* has probably been responsible for more human deaths than sharks.

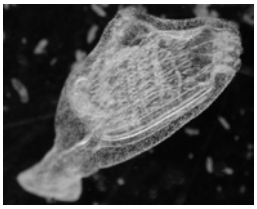
Ctenophore

Ctenophore (size range 0.5 - 3.0 cm diameter).
Cténophore (diamètre de l'ordre de 0.5 à 3.0 cm).

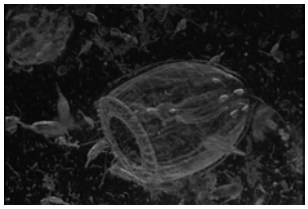
Bryozoan



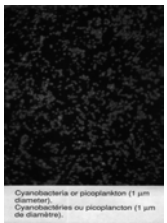
Tunicate



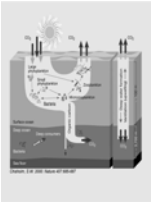
Bedford Basin Plankton



Bacteria

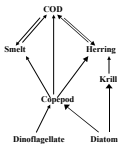


Nutrient Food Web

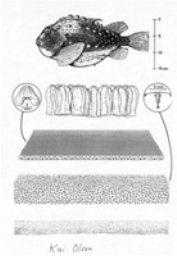


Food Chain

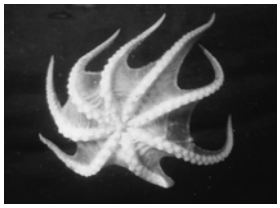
Food Web



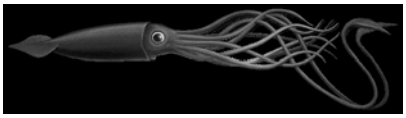
Biomagnification



Octopus Mouth

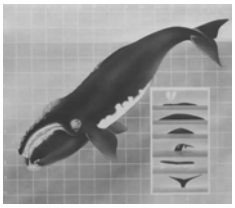


Giant Squid



Squid Beak

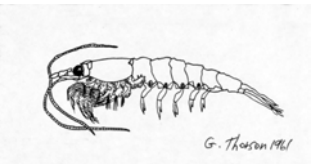
Right Whale



Shrimp

Krill/Eye Bait
Euphausiid Shrimp

True / Light

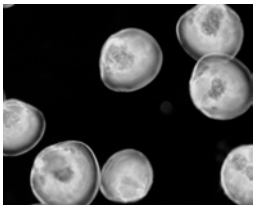


Sea Flea

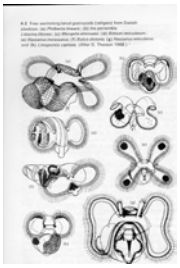
Amphipod

Polychaete Worm

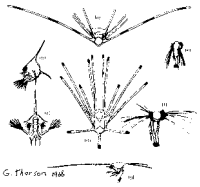
Bivalve Larva



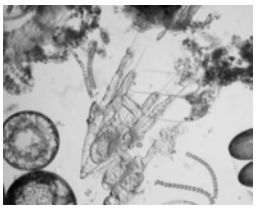
Gastropod Larvae



Various Larvae

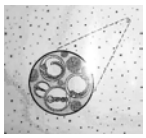


Sea Urchin Larva



Cod Larva

Cod Egg



Cod