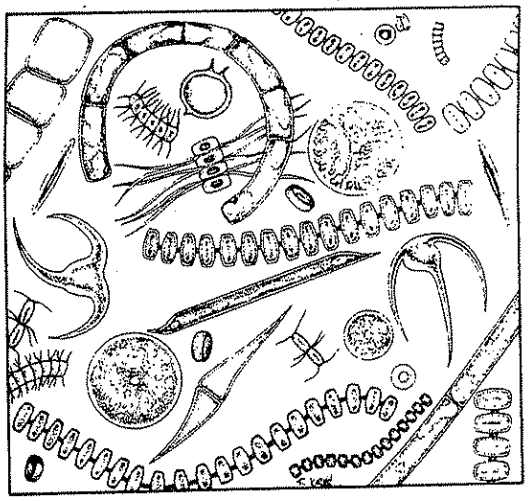
The Great Plankton Race

Plankton

The word **plankton** comes from the Greek word *planktos* meaning, "wandering." Because of their small size or weak swimming abilities, plankton are generally unable to move against currents. This makes them different from other organisms such as fish, an example of **nekton** that can swim strongly and propel themselves through the water. Some planktonic organisms can be quite large (like jellyfish). However, most are so small that they can only be viewed with a microscope.

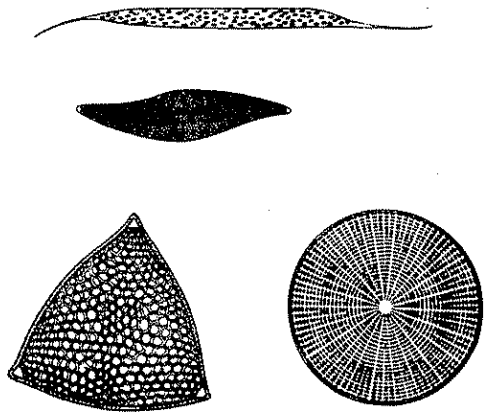
Phytoplankton

The plankton that capture light energy in the process of **photosynthesis** are called **phytoplankton.** Using **chlorophyll,** they capture the energy of the sun to make food, releasing oxygen in the process. In fact, phytoplankton produce up to 90% of the oxygen found in the air we breathe. Along with land plants, phytoplankton take in carbon dioxide in the process of photosynthesis. Therefore, they help to reduce the amount of carbon dioxide in the atmosphere. Increased levels of carbon dioxide in the atmosphere may be related to global warming. Phytoplankton are the **producers** of the ocean and other aquatic environments. They are the first link in the huge oceanic food chain. Directly or indirectly, nearly all aquatic life depends upon these microscopic single-celled organisms for food. When plankton die, they sink and become food for organisms living on the bottom.

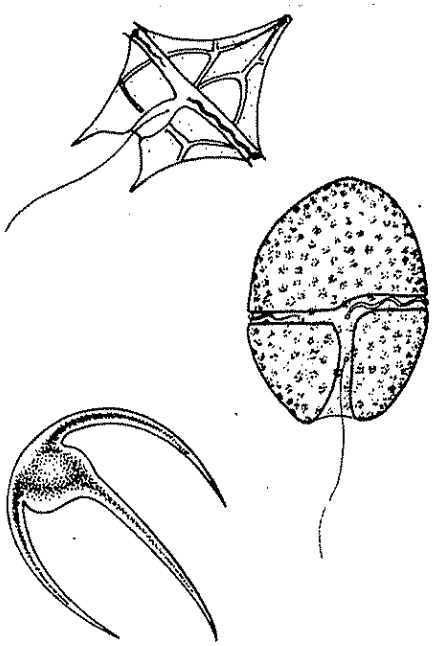


Phytoplankton are the microscopic producers of the ocean.

Diatoms are very common in the ocean, especially in colder waters. Diatoms are housed in beautifully decorated glass skeletons shaped like Petri dishes. Some diatom species form long chains, which help them float and avoid being eaten.



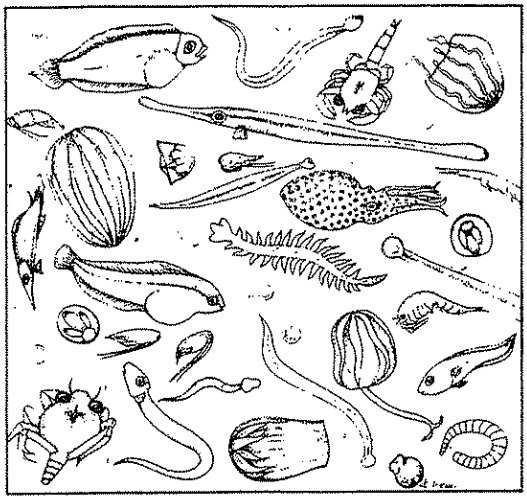
Some common planktonic diatoms.



Some common planktonic dinoflagellates.

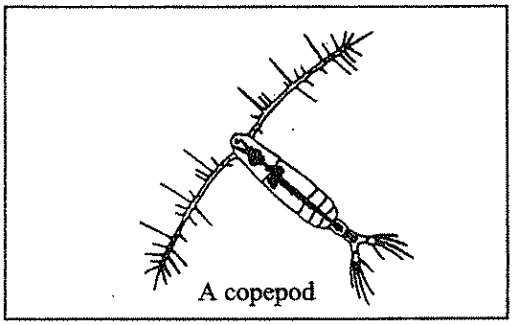
Dinoflagellates share both animal and plant traits. Like plants, most photosynthesize, but some eat other organisms. They can also swim using tiny whip-like flagella. Some dinoflagellates are **bioluminescent** and create light when disturbed by waves, boat wakes or predators. Other dinoflagellates produce **toxins**, which they release into the water. Sometimes, dinoflagellate populations grow very rapidly and become very numerous. During these **blooms**, they may become so abundant that the water turns red. These **"red tides"** can cause fish kills due to poisoning and oxygen depletion. During some months, mussels and other filter-feeding shellfish are unsafe to eat due to concentrated dinoflagellate toxins, which can cause Paralytic Shellfish Poisoning in humans.

Zooplankton



Zooplankton are planktonic consumers.

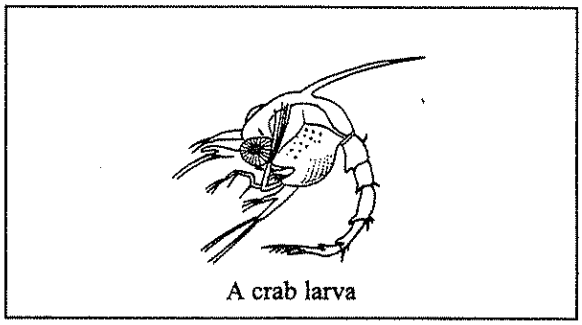
The plankton that eat other plankton (**consumers**) are called **zooplankton**. Most major animal groups have representatives in the zooplankton. Many zooplankton are able to move up and down in a water column, pursuing food and escaping **predators.** With nowhere to hide in the open sea, many plankton species are transparent, and nearly invisible. In addition, many have long spines to help repel predators and to help with flotation.



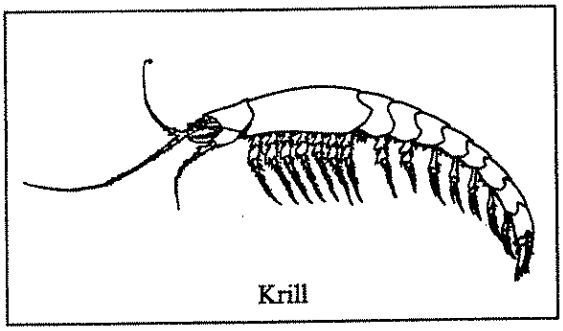
A copepod

The most numerous zooplankton group are the **crustaceans**. Some, like the **copepods**, spend their entire lives as plankton. Copepods eat phytoplankton. As the most numerous animals on Earth, they are critically important to the ocean ecosystem.

Some crustaceans, like **crab larvae**, are temporary members of the plankton community. They live through the early stages of their life as plankton, and eventually settle to the bottom to live their adult lives.



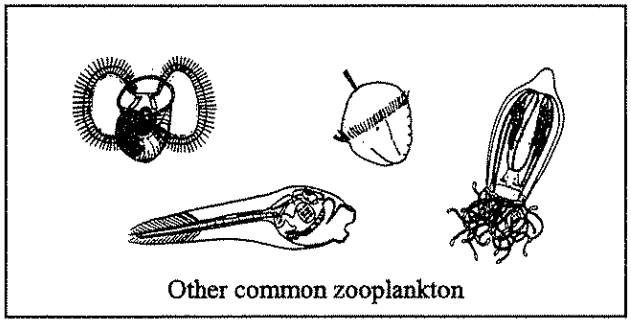
A crab larva



Krill

Shrimp-like **krill** are among the most well known plankton because they are the major food source for some of the great whales.

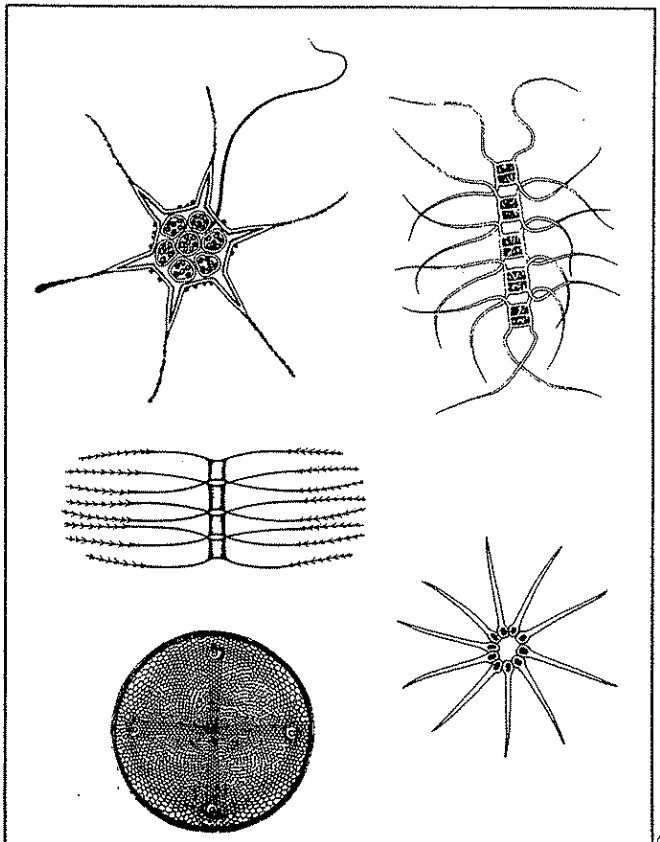
Other common zooplankton groups include the adults and larvae of jellyfish, snails, clams, arrow worms, comb jellies, fish larvae, and sea squirts.



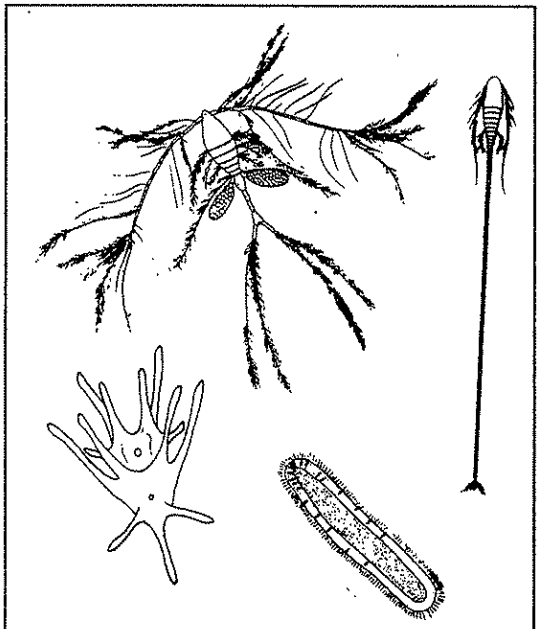
Other common zooplankton

Sinking

All plankton must avoid sinking. Phytoplankton must stay within the **photic zone** (light zone) in order to receive enough sunlight energy to carry on photosynthesis. However, if they are too close to the surface, photosynthesis is less efficient and the intense light can be harmful to the organisms. Phytoplankton are found in a fantastic variety of shapes, incorporating **adaptations** that help keep them from sinking. Plankton avoid sinking by increasing their surface area and/or decreasing their density. For example, phytoplankton may be round and flat or have appendages, spines, and other body projections that slow sinking. Some diatoms resist sinking by forming chains that increase surface area. The use of low-density substances like oil or fat helps increase buoyancy and can serve as stored food.



Adaptations of phytoplankton to slow sinking.



Adaptations of zooplankton to slow sinking.

Zooplankton depend on phytoplankton and other zooplankton for food, so they must avoid sinking as well. Zooplankton are often wide and flat, and many have long spines and bristles, but they have an advantage over phytoplankton – they can swim. Tiny movements of their appendages can propel them and keep them in the food-filled zone of the ocean. Some zooplankton also rely on accumulating tiny amounts of oils, which help serve as flotation. In addition, water currents caused by **convection** and **upwelling** can stir the water and help keep plankton from sinking.