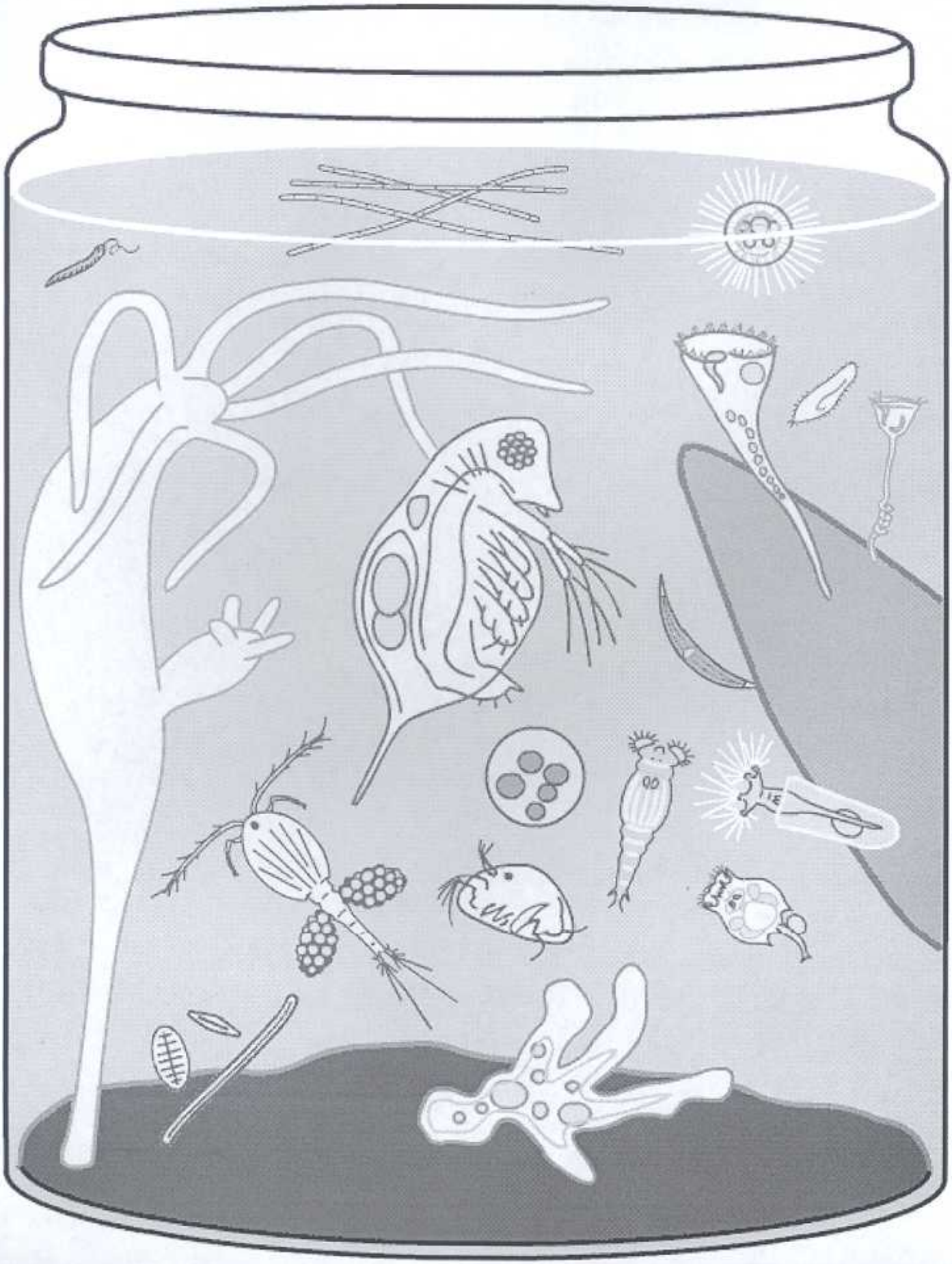
Microorganisms Commonly Found in Pond Water



AMOEBA

Amoeba may look like a blob, but each species has specific shapes and appearance. Amoeba possess a kind of inner structure that defines their range of forms. The 'looks' of amoebas are a result of their so-called 'pseudopodia' (false feet) that come in several types. Some amoeba have many 'pseudopods' (polypodial). Others have only one (monopodial). Some groups have long extensions, almost like spines.

Amoebas also use pseudopodia for feeding. Chemical stimuli from smaller organisms, the amoeba's food, induce the formation of pseudopodia, pairs of which envelop the organism, at the same time forming a cavity, or vacuole. A digestive enzyme secreted into the cavity breaks down this food into soluble chemical substances that then diffuse from the cavity into the cytoplasm.

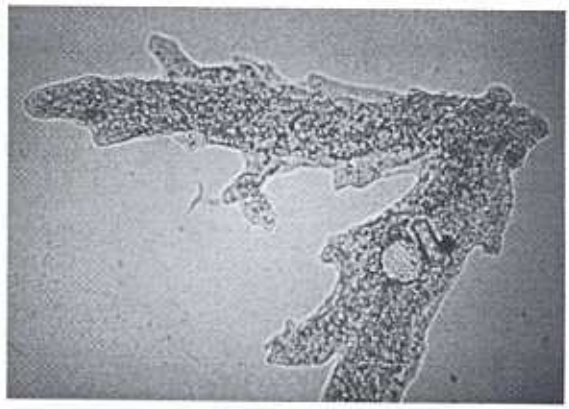
Amoeba engulfing a paramecium

An amoeba, a single-celled organism lacking internal organs, is shown approaching a much smaller paramecium, which it begins to engulf with large outflowings of its cytoplasm, called pseudopodia.

Amoebas are considered the most primitive animals. This group includes hundreds of different organisms, ranging in size from about .25 to 2.5 mm (about 0.0098 to 0.098 in). Some species live on aquatic plants and some in moist ground; others are parasitic in animals. At least six forms of amoeba are parasitic in humans. They cause diseases that often occur in epidemics when raw sewage contaminates water supplies or when soil is fertilized with untreated human wastes.

Reproduction of an amoeba

The single-celled amoeba demonstrates a simple method of reproduction; it divides in half by a process called fission, producing two smaller daughter cells. After a period of feeding and growth, these two daughter cells will themselves divide in half.

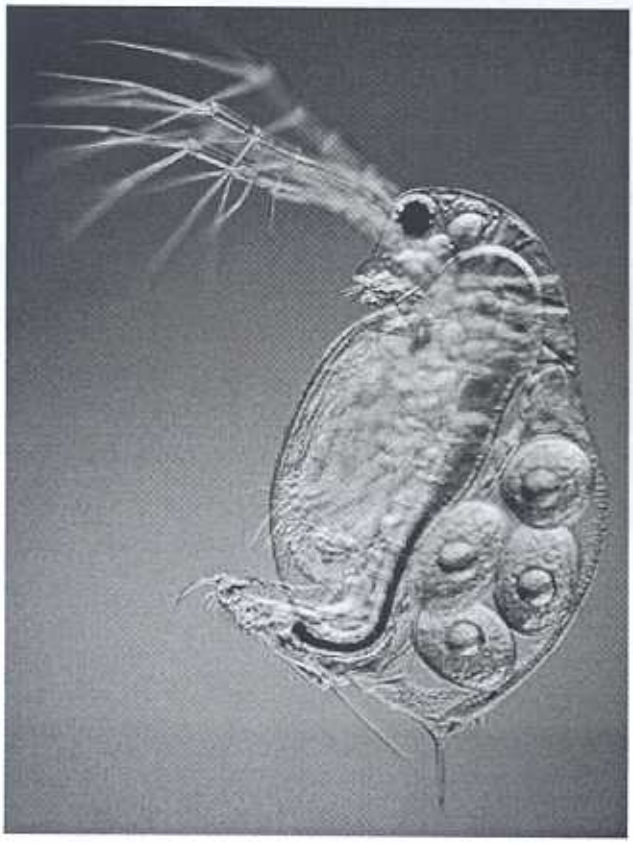


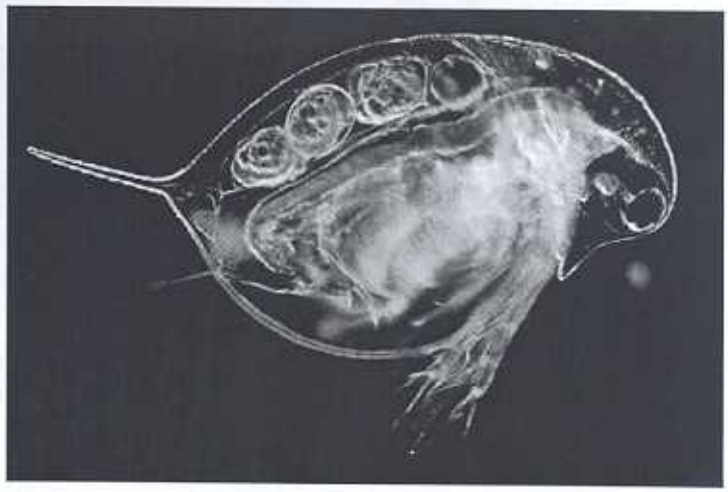
DAPHNIA

Daphnia, or water fleas, are part of the crustacean group that is found in freshwater ponds. This is the group of animals that is best known for the crabs and lobsters. But they have many microscopic relatives. With the insects they belong to a large group called the arthropods. They all have segmented limbs and a hardened external skeleton made of chitin.

They are the most numerous organisms in freshwater zooplankton. They can be seen with the naked eye because some species can reach a size of almost 6 millimeters. With a good hand lens you can observe many interesting features.

One of the most obvious features is the large antennae. They use them for locomotion. Above the antennae you can see the large eyes. It looks like a single eye but it consists of two compound eyes that are fused together. Inside the bivalved protective shell called the carapace lies a row of five or six pairs of feet they use to filter food (small algae). The food can be seen as the yellow brown substance. Left of the gut, eggs can be seen.

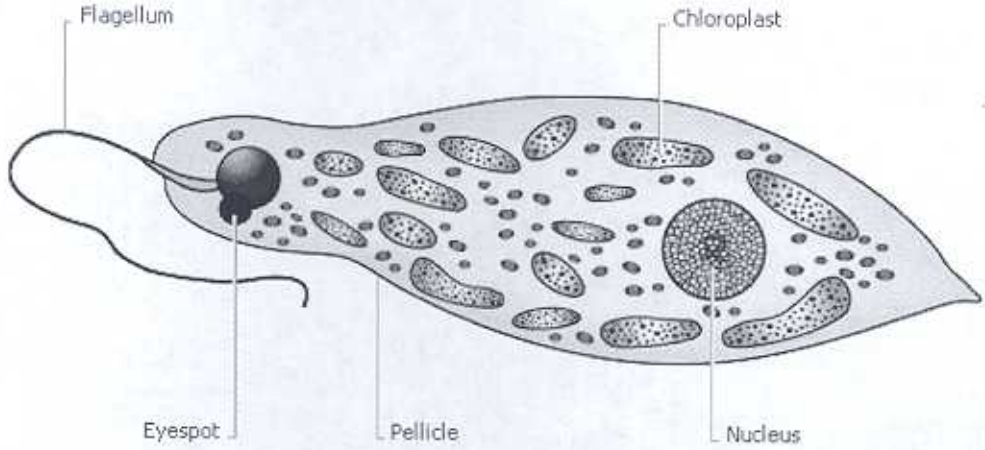




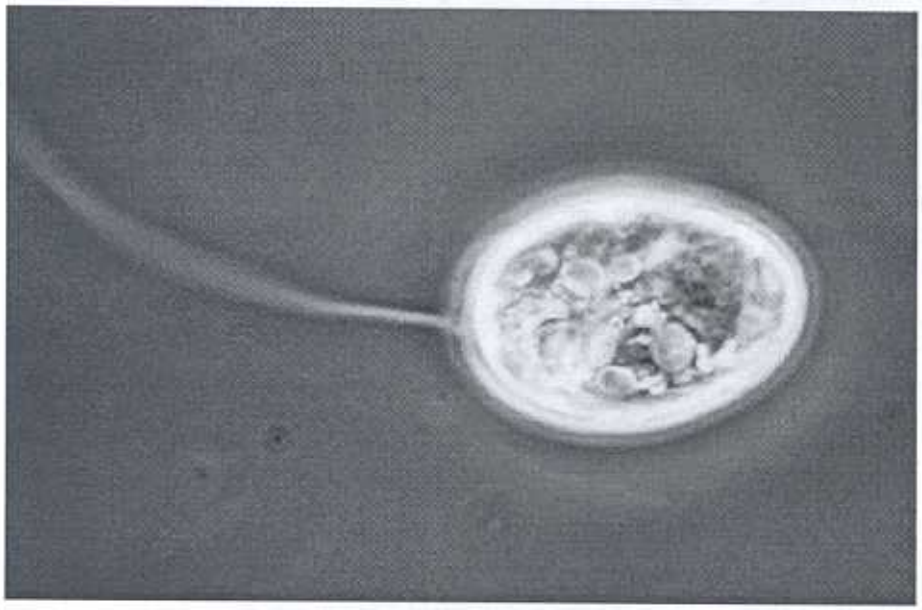
Daphnia is one of the more common waterfleas. The gut is green of digested algae. The eggs are clearly visible.

EUGLENA

Euglenas are one-celled organisms common in freshwater habitats, but are sometimes found also in marine environments. These organisms have both animal and plant characteristics. They frequently are photosynthetic and make their own food. However, some feed like animals.



Euglenas have spindle-shaped bodies, and range in size from 1/1000 to 1/100 of an inch (0.025 to 0.254 millimeter) long. A typical Euglena has a pair of flagella, or whip-like appendages used in swimming, at the front end. It also executes a kind of crawling movement by changing the shape of its body. An eyespot enables it to move toward or away from light. Many of them contain several chloroplasts, which give them a greenish color. They reproduce by fission, or dividing in two. There are over 800 "species" of Euglenas.



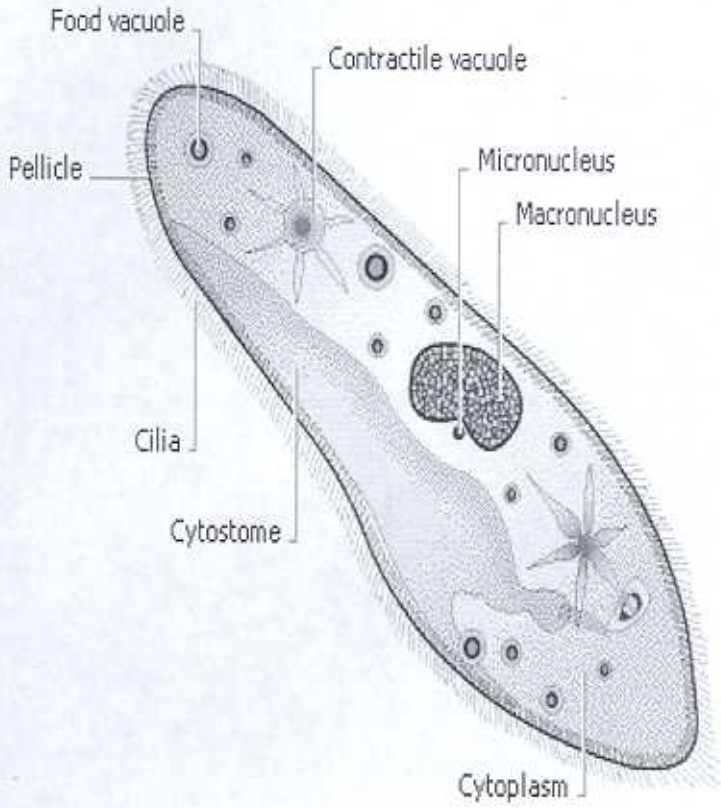
Euglena with a whip-like tail

The euglena is a single-celled alga with two or several flagella (depending on the species) located at one end for locomotion.

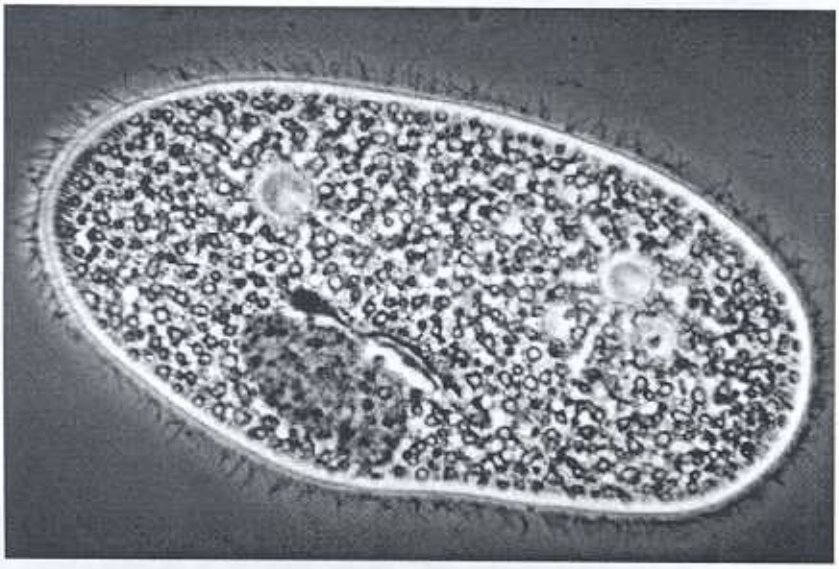
PARAMECIUM

Paramecium are often called slipper animalcules because of their slipperlike shape. Paramecia abound in freshwater ponds throughout the world; one species lives in marine waters. In soils, paramecium break down organic matter into substances that can be used by other organisms. Paramecia are one-celled organisms usually less than 0.25 mm (0.01 in) in length.

They are covered with about 2,500 tiny hairlike projections called cilia. Cilia are used in locomotion. They move back and forth like oars to help the paramecium move about. When moving through the water, paramecia follow a spiral path while rotating on the long axis. When a paramecium encounters an obstacle, it exhibits the so-called avoidance reaction: It backs away at an angle and starts off in a new direction.



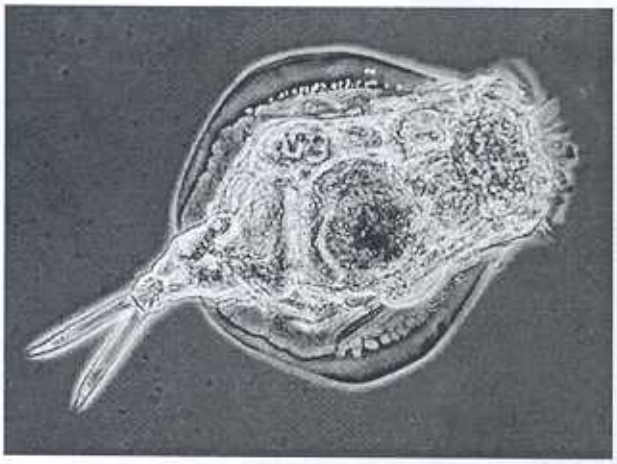
The paramecium eats tiny organisms, such as bacteria, that are swept by the cilia into an indentation in the cytostome called the oral groove. The organisms are eventually passed into a food vacuole, a small, round structure where food is digested, and are then passed into the cytoplasm. A paramecium has a large nucleus called a macronucleus, without which it cannot survive, and one or two small nuclei called micronuclei, without which it cannot reproduce.

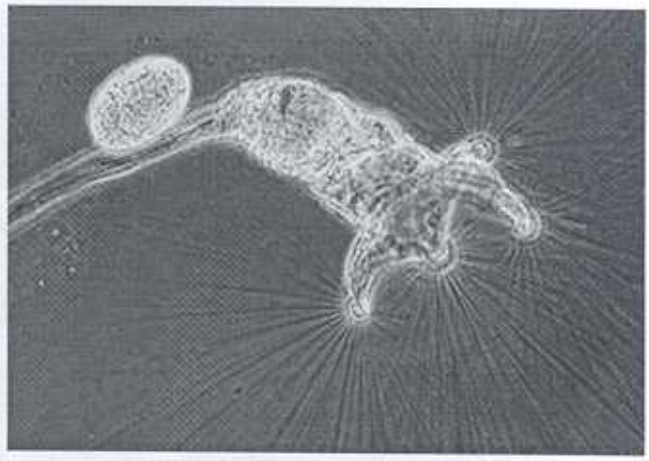


Ciliated protozoans such as the paramecium pictured here are single-celled organisms that propel themselves by minute, hairlike projections called cilia.

ROTIFER

Rotifers are multicellular, generally microscopic, aquatic animals that are abundant worldwide. They are about the same size as the larger unicellular organisms. They don't have a lot of cells, less than 1000, They are a group of microscopic animals that live just about anywhere there is fresh water, including lakes, ponds, streams, puddles, ditches, wet shorelines (especially sand), and even on wet mosses. Most rotifers live about a week. They are most plentiful in late Spring.





Each rotifer has a clear tube it can pull itself into, like a turtle. The entire animal is transparent, so you can see its food inside. Rotifers have a cylinder-shaped body made of three sections: head, trunk, and foot. The "foot" usually has two "toes" at the bottom. The head of a rotifer has a large, cup-shaped mouth, surrounded by cilia. Cilia are tiny hair-like things which wave back and forth.

To eat, a Rotifer extends its body fully from its tube and waits for small swimming organisms to get close. Once an organism touches the rotifer's cilia, it gets sucked into its mouth. Common foods of rotifers include: algae, protozoa (such as amoeba and paramecium), small crustaceans (such as water fleas and copepods), and small bits of plant or animal matter floating in the current. They'll pretty much eat anything that fits into their mouths. However, aquatic insects, crustaceans (crayfish, water fleas, copepods), small fish, and amphibians are predators of them.

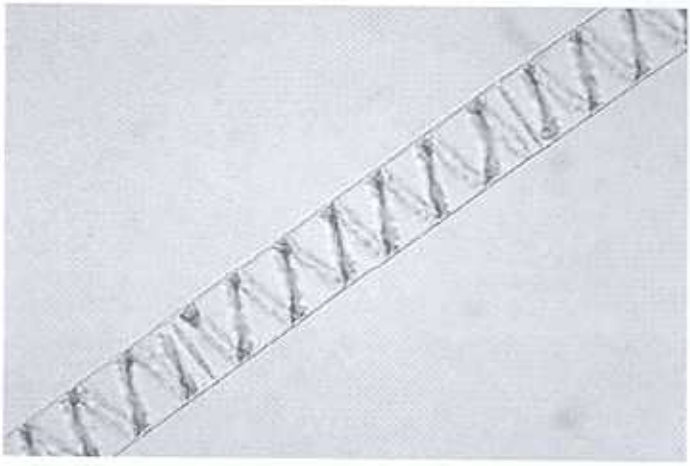
Some rotifer species spend most of their lives swimming around, but most attach to one place and stay there for the rest of their lives. It swims when it is young and hasn't found its place to attach yet. When the young rotifer is ready, it uses a sticky substance from its foot to attach itself to an aquatic plant.

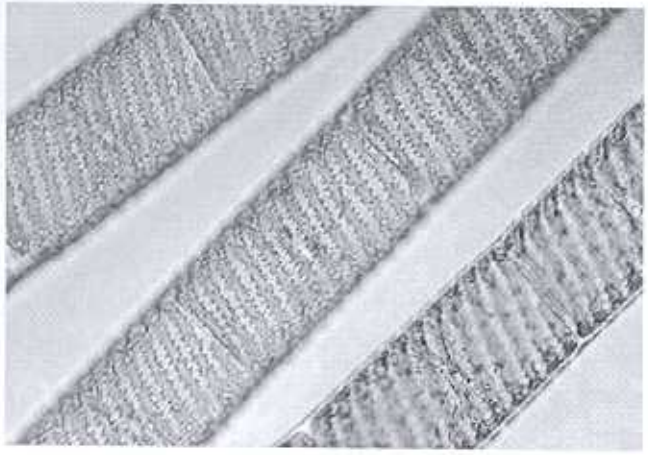
SPIROGYRA (GREEN ALGAE)

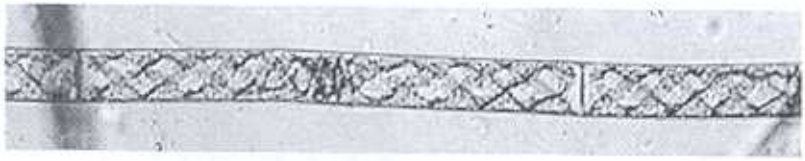
Algae is a diverse group of simple, plantlike organisms. Like plants, most algae make their own food because they have chloroplasts. However, algae lack the roots, leaves, and other structures typical of true plants. Algae form the foundation of most aquatic food webs, which support an abundance of animals.

Algae vary greatly in size and grow in many diverse habitats and there are more than 400 species around the world. Although most algae grow in fresh water or seawater, they also grow on soil, trees, and animals, and even under or inside porous rocks, such as sandstone and limestone. Algae tolerate a wide range of temperatures and can be found growing in hot springs, on snow banks, or deep within polar ice.

A common alga is the spirogyra. This type of algae owes its name to a chloroplast (the green part of the cell) that is wound into a spiral, which makes it easily to recognize. If we look at a filament of Spirogyra with the microscope, the first thing that attracts attention is the chloroplast, a narrow, banded spiral with serrated edges. It is formed by single cells that are arranged end to end to form long threads, filaments. These filaments can be up to many centimeters long.







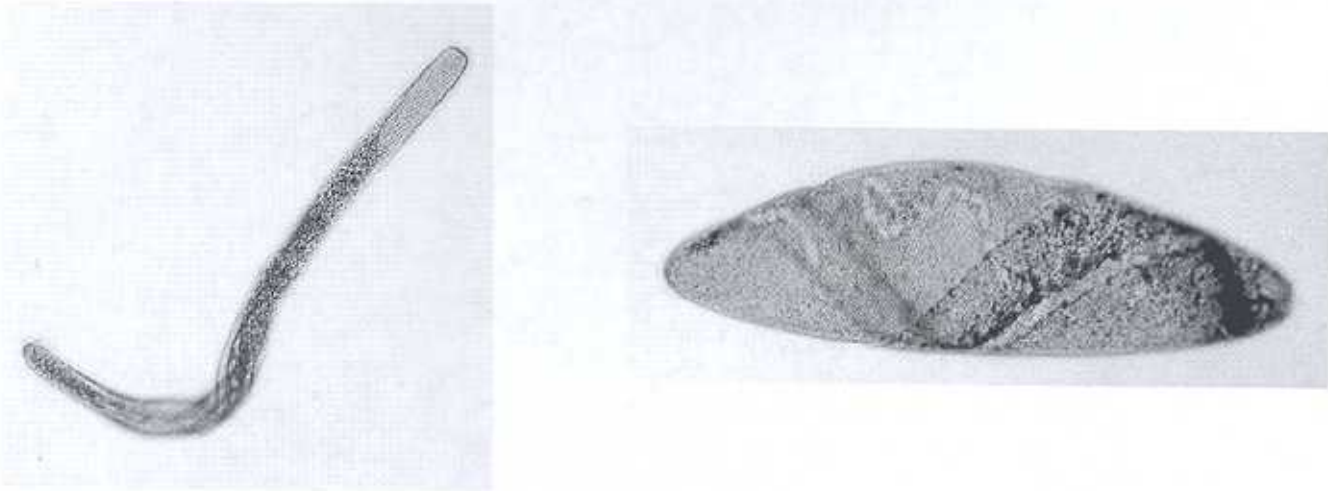
SPIROSTOMUM

The spirostomum can grow to a size of more than 4 millimeters and can therefore, be seen without the help of a microscope. When observed swimming in a little jar of pond water it looks like a little worm. Only with the help of a microscope you can see that it is a ciliate. This one-celled organism is totally covered with hairlike 'cilia'.

One of the remarkable things of Spirostomum is the way it can contract. The organism can contract it's body to 1/4 of it's length in 6-8 milliseconds. When observing the creature under the microscope it is easy to watch the contraction by gently touching the sample.

Like many large single celled organisms it has not one nucleus, but many. The nucleii form a long strand, like a string of pearls, visible as the lighter structure in the right image.

Spirostomum, like many cilates, feeds on bacteria. They are swept into the mouth opening with a row of specialized fused cilia. The mouth opening is very small and can be found on the side of the body.

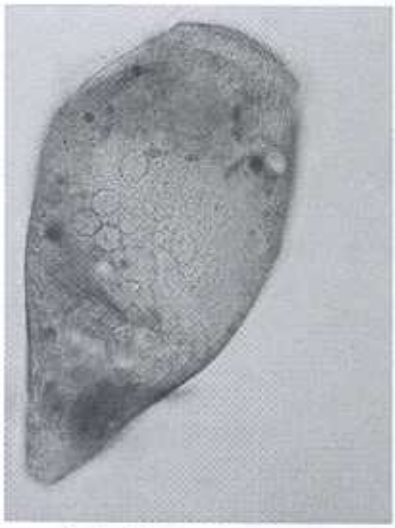


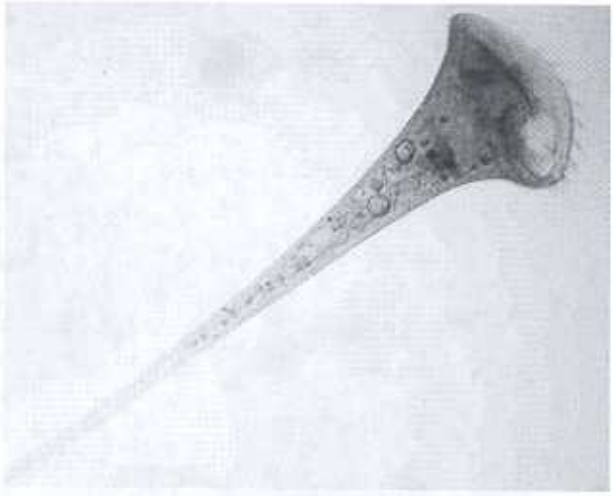
The pictures show the Spirostomum stretched (left) and contracted (right).

STENTOR

Stentors are also known as the "trumpet animalcule" because it looks like a trumpet. When attached to something, the Stentor has a trumpet shape. Any disturbance makes the whole body contract to become a blob of protoplasm. It shrinks back and contracts then reaches out and stretches while feeding.

A key identification feature is the presence of cilia (minute hair-like projections) on the oral region and along the sides of the organism. The Stentor beat the cilia and create a vortex like movement with there cilia drawing in single celled bacteria to feed on.





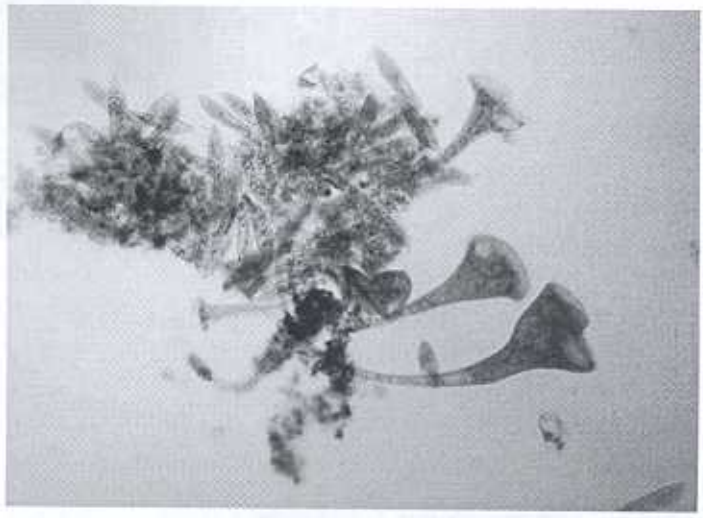
They are some of the largest protozoans known and some species can be up to two millimeters (0.08 inch) long. Oftentimes, they are larger than many microscopic multicellular organisms such as rotifers and water fleas, and have been known to eat smaller members of these groups.

Stentors are usually present in freshwater ponds. In ornamental ponds or lagoons, Stentor can be very colorful - there can be green, blue and amethyst colored species. The green color is a result of ingested microscopic green algae. The algae live in symbiosis with the Stentor, i.e. the algae and Stentor mutually benefit from the close association. The algae uses photosynthesis to convert Stentor's waste products to useful nutrients.

The Stentor is remarkable for its regenerative powers; a fragment as small as one-hundredth the volume of an adult can grow back to a complete organism.

Stentors and Paramecia

When the Stentors get together, there's hardly a parking place left to be found anywhere!



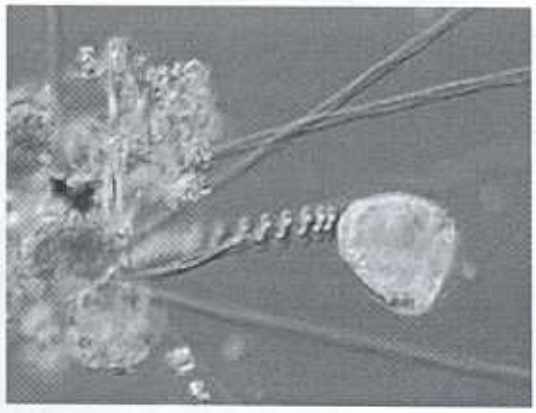
VORTICELLA

Vorticella was also called the "bell animalcule" because when it is extended, it looks like a bell. Extending from the bell, is a stalk that can be pulled into a tight spiral when the organism is disturbed. Once the disturbance is gone, it will slowly extend the stalk. This contraction holds the record for the fastest known action in the Animal kingdom.

Vorticella are one-celled organisms. Vorticella is an organism that attaches itself to other animals. They possess cilia (tiny hairlike projections) which they use for locomotion and feeding. The bell of a vorticella is 150 µm (µm = 1 micrometer = 1 millionth of a meter) and the stalk can measure up to 1 mm.

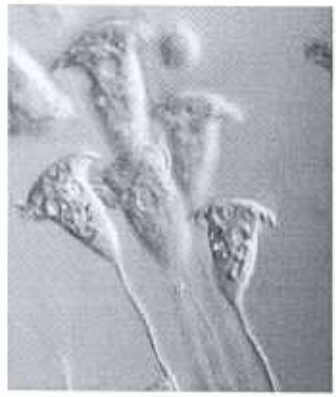
Vorticella feeds by means of cilia which are present around the margins of its cavity ("mouth"). The movement of the cilia create a current of water, a vortex, which directs food particles towards the cavity. After food has entered the cavity, the contractile stalk of the organism retracts and the food is "swallowed."

Vorticella attached to duckweed rootlet



Vorticella, pulled back on it's coiled stalk

Their nucleus is divided into two portions, a macronucleus and a micronucleus. The macronucleus controls the functions of the cell. The micronucleus is involved in reproduction. Reproduction in Vorticella is usually accomplished by binary fission, in which a new organism is "pinched off" of the adult. This new organism can remain attached or swim freely to a new location before becoming sessile.



A group of Vorticella feeding.