

Ameba Coloring

The **ameba** is a protozoan that belongs to the **Kingdom Protista**. The name ameba comes from the Greek word amoibe, which means change. (Ameba is also spelled amoeba.) Protists are microscopic unicellular organisms that don't fit into the other kingdoms. Some protozoans are considered plant-like while others are considered animal-like. The ameba is considered an animal-like protist because it moves and consumes its food. Protists are classified by how they move, some have cilia or flagella, but the ameba has an unusual way of creeping along by stretching its cytoplasm into fingerlike extensions called **pseudopodia**. The word "pseudopodia" means "false foot". On the coloring sheet, there are several pseudopodia, use a yellow highlighter, marker, or pencil to highlight each of them (color around the outside of them). When looking at ameba under a microscope, an observer will note that no ameba looks the same as any other; the **cell membrane** is very flexible and allows for the ameba to change shape. Color the cell membrane red. Amebas live in ponds or puddles, and can even live inside people.

There are two types of cytoplasm in the ameba, the darker cytoplasm toward the interior of the protozoan is called **endoplasm**, and the clearer cytoplasm that is found near the cell membrane is called **ectoplasm**. (On the coloring, the endoplasm is indicated by the dotted area, and the ectoplasm by the white area.) Color the endoplasm blue, and leave the ectoplasm uncolored. By pushing the endoplasm toward the cell membrane, the ameba causes its body to extend and creep along. It is also by this method that the ameba consumes its food. The pseudopodia extend out and wrap around a food particle in a process call **phagocytosis**. The engulfed food then becomes a **food vacuole**. There are several food vacuoles on the drawing - color each brown. The food will eventually be digested by the cell's **lysosomes**.

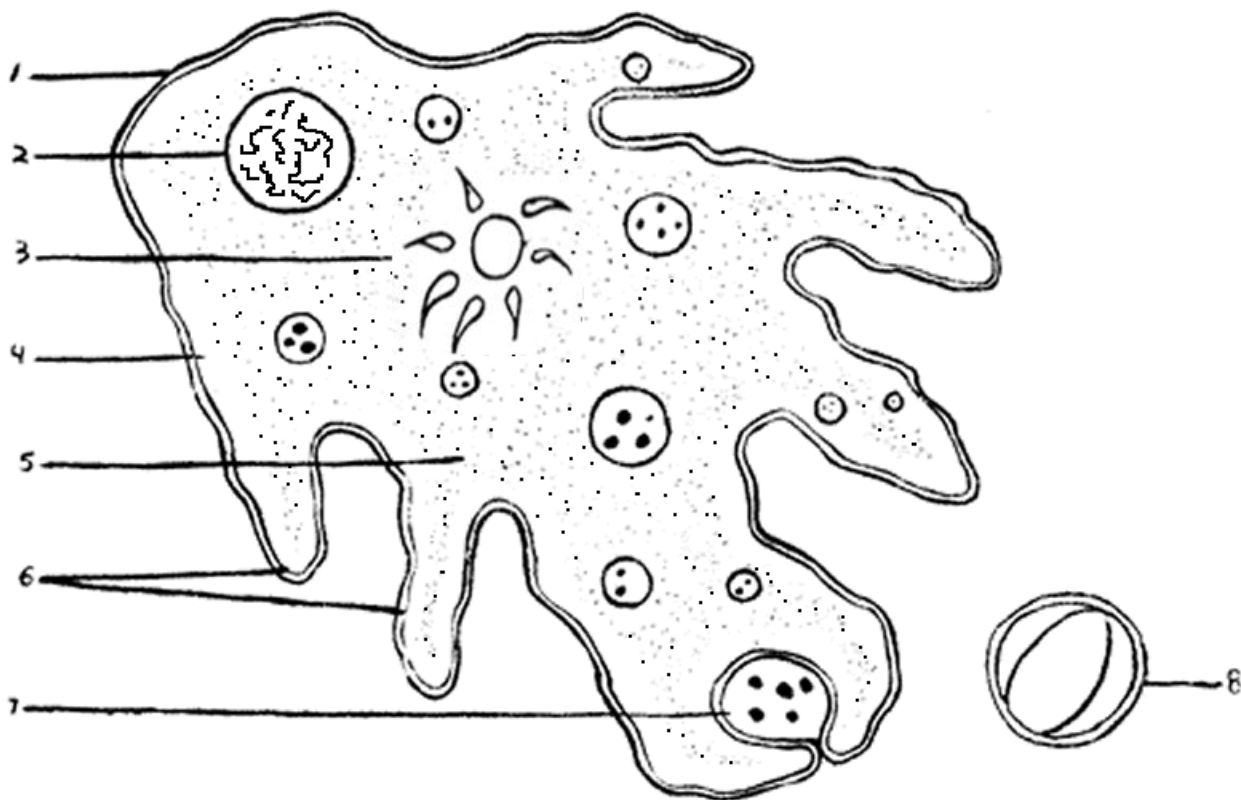
Also visible in the ameba is the **nucleus**, which contains the ameba's DNA. Color the nucleus purple. In order to reproduce the ameba goes through **mitosis**, where the nucleus duplicates its genetic material and the cytoplasm splits into two new daughter cells, each identical to the original parent. This method of reproduction is called **binary fission**. Another structure easily seen in the ameba is the **contractile vacuole**, whose job is to pump out excess water so that the ameba does not burst. Color the contractile vacuole orange.

During unfavorable conditions, the ameba can create a **cyst**, this hard-walled body can exist for a long period of time until conditions become favorable again. At this point it opens up and the ameba emerges. Often cysts are created during cold or dry periods where the ameba could not survive in its normal condition. Color the cyst green.

Amebas can cause disease. A common disease caused by the ameba is called **Amebic Dysentery**. A person becomes infected by drinking contaminated water. The ameba then upsets the person's digestive system and causes cramps and diarrhea. A person is most likely to be infected in countries where the water is not filtered or purified.

Questions:

1. How does an ameba move?
2. What structure contains the ameba's DNA?
3. How does an ameba reproduce?
4. During unfavorable conditions, an ameba forms a ... ?
5. Fingerlike extensions of the ameba's cytoplasm are called ...?
6. What disease is caused by the ameba?
7. To what Kingdom does the ameba belong?
8. How are protozoans classified?



CELL MEMBRANE 1
CONTRACTILE VACUOLE 3
PSEUDOPODIA 6
ENDOPLASM 5

ECTOPLASM 4
FOOD VACUOLE 7
NUCLEUS 2
CYST 8

EUGLENA

Directions: Color the Euglena according to the directions. Organelles can be identified based on their descriptions and locations. If you do not have access to colored pencils, etc. LABEL the parts instead of coloring them.

Euglena are unicellular organisms classified into the Kingdom Protista. Euglena usually live in quiet ponds or puddles

Movement

Euglena move by a **flagellum** which is a long whip-like structure that acts like a little motor. The flagellum is located on the front end, and twirls in such a way as to pull the cell through the water. It is attached at an inward pocket called the **reservoir**. **Color the reservoir grey and the flagellum black.**

Feeding

The Euglena is unique in that it is both *autotrophic* (can make its own food) and *heterotrophic* (must eat food). **Chloroplasts** within the euglena trap sunlight that is used for photosynthesis, and can be seen as several rod like structures throughout the cell. **Color the chloroplasts green.** Euglena also have an **eyespot** at its front end that detects light; it can be seen near the **reservoir**. This helps the euglena find bright areas to gather sunlight to make their food. **Color the eyespot red.** Euglena can also gain nutrients by absorbing them across their **cell membrane**. They become *heterotrophic* when light is not available and they cannot photosynthesize.

Structure

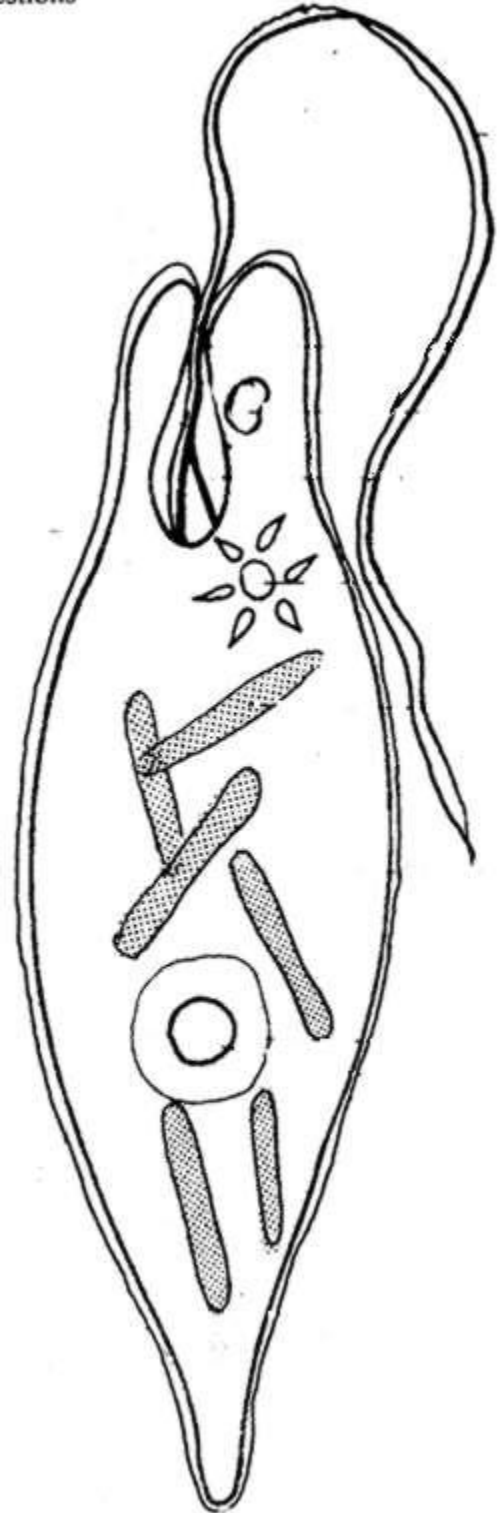
The euglena has a stiff **pellicle** outside the **cell membrane** that helps it keep its shape. The pellicle is somewhat flexible and some euglena can be observed scrunching up and moving in an inchworm type fashion. **Color the pellicle blue.**

In the center of the cell is the **nucleus**, which contains the cell's DNA and controls the cell's activities. The **nucleolus** can be seen within the **nucleus**. **Color the nucleus purple, and the nucleolus pink.**

The interior of the cell contains a jelly-like fluid substance called **cytoplasm**. **Color the cytoplasm yellow.** Toward the front of the cell is a star-like structure: the **contractile vacuole**. This organelle helps the cell remove excess water, and without it the euglena could absorb so much water that the cell would explode. **Color the contractile vacuole orange.**

Reproduction

Euglena reproduce asexually,



***Answer the following questions**

1. Are euglena unicellular or multicellular?
2. What Kingdom do euglena belong to?
3. What organelle carries out photosynthesis?
4. On which end is the flagellum located?
5. Define autotrophic.
6. Define heterotrophic.
7. Describe the two ways in which the euglena get their nutrients.
8. What is the eyespot used for?
9. What is the function of the nucleus?
10. What is the function of the contractile vacuole? What would happen if the cell did not have this organelle?

Paramecium Coloring

Paramecium are unicellular protozoans classified in the phylum Ciliophora (pronounced sill-ee-uh-FORE-uh), and the Kingdom Protista. They live in quiet or stagnant ponds and are an essential part of the food chain. They feed on algae and other microorganisms, and other small organisms eat them. All members of the Phylum Ciliophora move by tiny hair-like projections called cilia. **Color all cilia black.** The paramecium cannot change its shape like the ameba because it has a thick outer membrane called the pellicle. The pellicle surrounds the cell membrane. **Color the pellicle light blue.**

There are two types of nuclei (plural of nucleus). The large nucleus is called the macronucleus which controls cell activities such as respiration, protein synthesis and digestion. **Color the macronucleus red.** The much smaller micronucleus is used only during reproduction, **color the micronucleus pink.** Reproduction in paramecium involves the exchanging of DNA within the micronucleus. In order to do this, two paramecium lie side by side and join at the mouth pore. This process is called conjugation and is a method of sexual reproduction in other microorganisms.

Contractile vacuoles are used in animal cells to remove the excess water. The contractile vacuole is shaped like a star - **color the contractile vacuole dark green.**

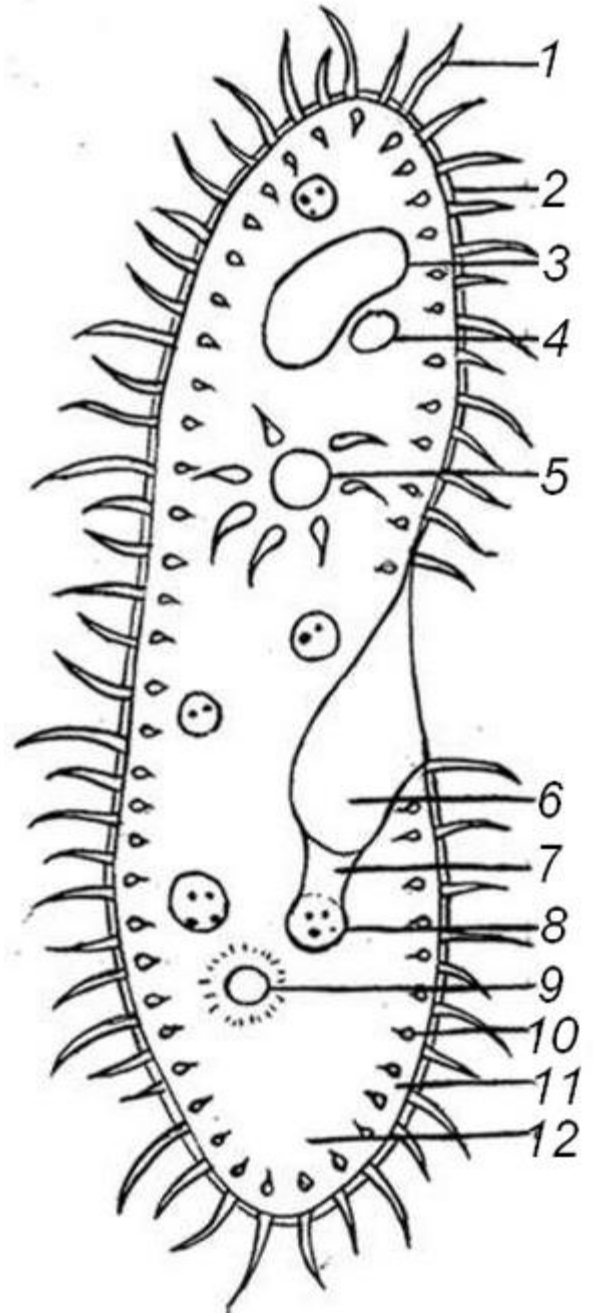
Paramecium are heterotrophs, meaning they must consume food for their energy. Food enters the paramecium through the **mouth pore (color orange)** and goes to the **gullet (color dark blue)**. The area of the paramecium appears pinched inward and is called the oral groove, cilia sweep food into this area. At the end of the gullet, food vacuoles are formed. Food vacuoles then remain in the cytoplasm until the food is digested. **Color all food vacuoles light brown.** Undigested food particles are eliminated through the **anal pore (color dark brown).**

Paramecium can respond to temperature, food, oxygen and toxins and have a very simple defense mechanism. Just inside the pellicle are threadlike organelles called trichocysts. The paramecium can shoot tiny threads out of the cell to entangle a predator or to make themselves appear bigger. **Color the trichocysts purple.** Paramecium are also known to exhibit avoidance behavior. This is where the paramecium will move away from a negative or unpleasant stimulus.

There are 2 kinds of cytoplasm in the paramecium. The cytoplasm around the edges is clear and is called ectoplasm. **Leave the ectoplasm clear.** The rest of the cytoplasm is more dense and appears darker. This is called the endoplasm. Remember that the word "ecto" means outside, and the word "endo" means inside. **Color the endoplasm yellow.**

Questions

1. Is the paramecium a unicellular or multicellular organism?
2. To what Phylum and Kingdom do paramecium belong?
3. Define heterotroph.
4. What do parameciums eat?
5. How do all members of the Phylum Ciliophora move?
6. Why can't the paramecium change shape like the ameba?
7. What do the macronucleus and micronucleus do?
8. Define conjugation.
9. What is the function of the contractile vacuole?
10. What is the oral groove?
11. Wastes exit the paramecium through what structure?
12. What is the function of the trichocysts?
13. Compare the endoplasm to the ectoplasm.
14. Define avoidance behavior.
15. Where do paramecium live?

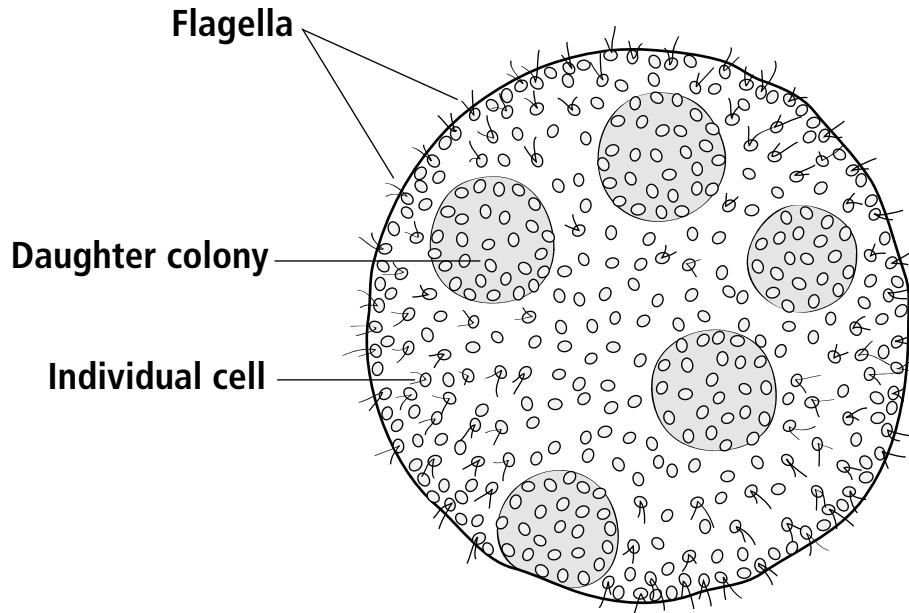


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|------------------------|-----------------|
| 1. Cilia | 7. Gullet |
| 2. Pellicle | 8. Food Vacuole |
| 3. Macronucleus | 9. Anal Pore |
| 4. Micronucleus | 10. Trichocysts |
| 5. Contractile Vacuole | 11. Ectoplasm |
| 6. Mouth Pore | 12. Endoplasm |

Volvox



Volvox are one-celled algae that live together in a colony. The colony is a hollow ball with 500 to 20,000 individual cells. Look for rolling green balls on the slide. When you see a volvox colony, look for the structures shown in the diagram.



Movement Each volvox cell has two flagella. The flagella beat together to roll the ball through the water.

Feeding Volvox cells have chlorophyll and make their own food by photosynthesis.

Reproduction Daughter colonies are small, dark green balls inside the volvox colony. When the daughter colonies mature, the parent ball bursts open and releases the daughter colonies.

Size 350 to 500 μm (Two or three volvox cells would fit in 1 mm.)

Answer the following question.

Volvox cells have eyespots that sense light. How do the eyespots help volvox survive?
