



Name _____

Date: ____/____/____ Block: _____

Fungi and Protists



“Dear Daphne how I long to run my pseudopods through your cilia.”

Fungi - Friends or Foes? Reading Comprehension

- 1 They're all around you. Open a door, and thousands of them float inside. They are too small for you to see. They are looking for food. Some land on a piece of bread, an orange, or an open jar of jam. Others land on damp clothes, a shower curtain, or sweaty socks. They leave fuzz behind wherever they have been eating. The fuzz can be blue, white, green, black, or pink.
- 2 Outside, millions of them feed on trees and flowers. Others feed on insects and other animals. Some eat wooden things like porches, fences, decks, and steps. They feed on these things until the objects fall apart. Others help plants and trees grow. They provide food for thousands of creatures. Many of them are nature's recyclers. Who are they? They are fungi (one is a fungus).
- 3 A fungus can be only one cell. Most fungi are more than one cell. Fungi cannot make their own food. Some fungi grow on foods that we eat. Some fungi grow on bread. We call it mold. Other kinds of fungi grow on living things. They can make the other living things sick. Mushrooms are fungi that get food from dead matter in the soil.
- 4 For hundreds of years, people thought that fungi were plants. Now they are classified into a separate group all by themselves. There are three main things that make fungi different from plants.
- 5 First, plants have roots, leaves, and flowers. Plants can use their leaves to make their own food from the sun's energy. Fungi have no leaves, flowers, or roots like plants do. They can't make their own food. Fungi feed on living or dead matter around them.
- 6 Second, plants are made from a material called cellulose. Fungi are made of chitin. Chitin is a tough material that is found in the outer skeletons of insects. Chitin is not found in plants.
- 7 Third, most plants reproduce, or make more of themselves, by making seeds in their flowers. Fungi reproduce in other ways.
- 8 Most fungi begin their lives as spores. Spores are tiny. When they land on something wet, they begin growing. The spore begins to grow a long thin tube called a hypha (plural: hyphae). The hyphae (say: hi-FEE) ooze powerful chemicals called enzymes. The enzymes slowly digest the food for the fungi. Unlike animals, fungi digest their food outside of their bodies. Then they absorb through the hyphae the nutrients that are released.
- 9 The hypha grows in many directions. Each hypha is like a tiny thread. They are a thousand times smaller than a human hair. In a few days, the hypha is twisting, turning, and branching back on itself. It begins to look like a mass of cobwebs. The only thing we can see is a little fuzz.
- 10 Some fungi grow very quickly. Within days, they can spread over a loaf of bread in your kitchen. They can cover a rotting orange in your refrigerator with blue fuzz. The mycelia of bread molds grow a balloon-like container at the ends of their threads. Each container is filled with new spores. These spores "ripen," fall, land on food, and begin to grow.
- 11 The spores are spread by wind, rain, and animals. Some fungi make millions of spores. Giant puffballs send up clouds of brown "smoke" with as many as five trillion spores. If each spore found food and began

growing, the Earth would soon be covered with fungus. Few spores find what they need to live and grow. That is why fungi make so many spores.

12 Many fungi are helpful to humans. Penicillin is a medicine used to treat infections. You have probably taken this medicine when you have been sick. Penicillin was first made from fungi. Some fungi have been used to treat heart disease. Another medicine made from molds is used to treat organ-transplant patients.

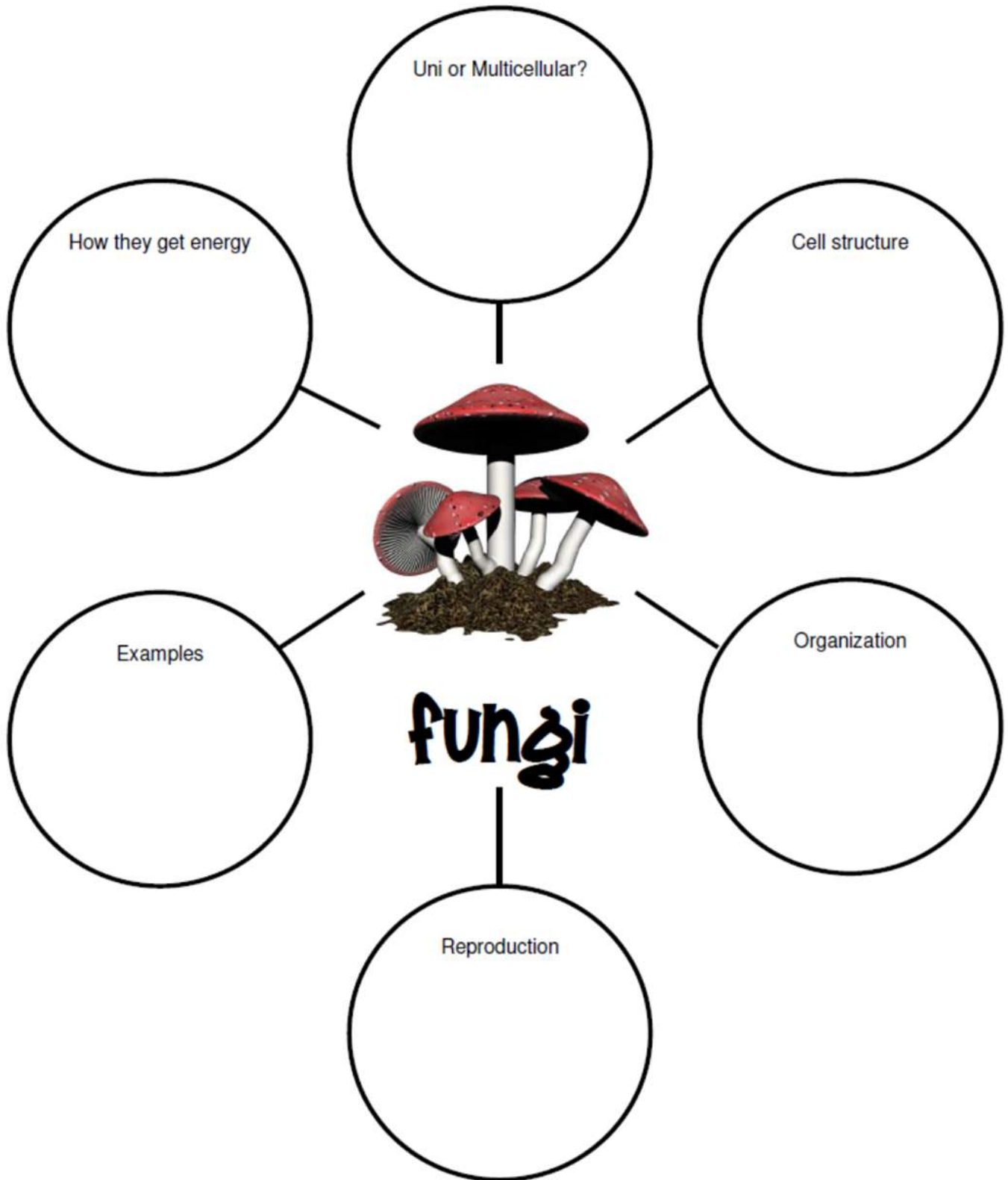
13 Yeasts are fungi that we use to make our bread light and soft. Molds give blue cheese and some other types of cheeses their blue streaks and tangy tastes. The citric acid in cola is made by a fungus.

14 Some fungi are not so good for humans. Athlete's foot and ringworm are two problems that are caused by fungi. Inhaling spores can cause asthma attacks in some people. Plants, too, are attacked by fungi. Dutch elm disease has destroyed many trees across Europe and North America. Molds attack grapes, chestnuts, and avocado trees.

15 Fungi also break down dead plant matter. They feed on leaves, branches, and other matter that is no longer living. As they eat the decaying matter, they release minerals and gases that nourish living plants and animals. They provide food and nesting material for small animals and birds.

16 Fungi can cause and cure disease. They can help other plants absorb nutrients or kill them. They can turn a lump of dough into a soft loaf of bread. They play a vital role on planet Earth. They can be both friend and foe.

1. A fungus can be only one cell or many cells. <input type="radio"/> A False <input type="radio"/> B True	2. What makes fungi different from plants? <input type="radio"/> A Plants have roots, leaves, and flowers, but fungi don't. <input type="radio"/> B Plants are made of cellulose, but fungi are made of chitin. <input type="radio"/> C Plants reproduce by making seeds, but fungi reproduce in other ways. <input type="radio"/> D All of the above
3. The chemicals the hyphae produce are called: <input type="radio"/> A Spores <input type="radio"/> B Enzymes <input type="radio"/> C Yeast <input type="radio"/> D Athlete's foot	4. How do fungi digest their food? <input type="radio"/> A With the sun's energy <input type="radio"/> B With their roots <input type="radio"/> C Outside their bodies
5. How can spores be spread? <input type="radio"/> A By wind, rain, and animals <input type="radio"/> B By ocean tides <input type="radio"/> C By magic	6. What do fungi leave behind when they eat? <input type="radio"/> A Fuzz <input type="radio"/> B Dutch elm disease <input type="radio"/> C Yeast
7. How many spores find what they need? <input type="radio"/> A A few of them <input type="radio"/> B Half of them <input type="radio"/> C All of them <input type="radio"/> D Most of them	8. What are some problems fungi can cause? <input type="radio"/> A Athlete's foot and ringworm <input type="radio"/> B Dutch elm disease <input type="radio"/> C Asthma attacks <input type="radio"/> D All of the above
9. What are two characteristics that all or most fungi share? 1. _____	



How Mushrooms Grow

Mushrooms like to live in dark, damp places. They feed off of the decaying matter around them using **mycelium**. As the mushroom grows, it develops **spores** in the **gills**. The gills are located on the underside of the **cap**. New mushrooms grow from these spores. The spores are so tiny that you can't see them without a microscope. Millions of spores together would look like fine powder. When the spores are ripe, they shoot out of the mushroom. Then they drift away on the wind. They mix with the spores of other mushrooms. If they land in a dark, damp place with a food source, they will grow into new mushrooms. First, they develop a threadlike structure called **hyphae**. Lots of hyphae grow together and form the **mycelium**. The hyphae and the mycelium grow under the surface where you can't see them. Because the mycelium of many kinds of mushrooms tends to grow in a circular pattern, the mushrooms often grow in a circle or ring. These rings are called "fairy rings" because people in the olden days thought they were made by fairies dancing through the night.

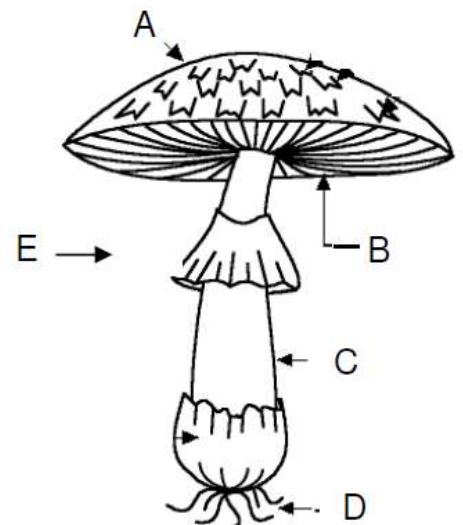
Next, the **fruiting body** starts to grow. It grows above the surface. When it first appears, it looks like a little button. This button-like part of the fruiting body is called the **cap**. The cap is protected by a thin covering called a **veil**. As the mushroom grows bigger, the veil splits and falls down around the **stalk** (stem) of the mushroom and forms the **annulus**.

Answer the reading comprehension questions below.

1. Mushrooms like to live in _____, _____ places.
2. They feed off of _____ matter around them.
3. New mushrooms grow from the _____.
4. The spores grow in the _____.
5. The gills are under the _____.
6. Spores shoot out of the gills and _____ with spores from other mushrooms.
7. The spores are spread by the _____.
8. When the spores begin to grow, they first develop _____.
9. The hyphae grow into a _____.
10. The mycelium produce a _____ that can be seen above the surface.

Label the mushroom on the right.

- A _____
B _____
C _____
D _____
E _____



After watching the video on Sir Alexander Fleming complete the questions below.

http://www.pbslearningmedia.org/asset/odys08_vid_discovery/

1. What world event inspired Sir Alexander Fleming to conduct his research experiments? _____

2. What caused the death of the majority of soldiers at this time? _____

3. What significant discovery did Fleming make? _____

4. How did Fleming “accidentally” make his discovery? _____

What is mold, anyway?

That fuzzy stuff growing on the bread is mold. There are thousands of different kinds of molds. The mold that grows on bread looks like white fuzz at first. If you watch the mold for a few more days, it will turn black. Mold is part of a larger family called fungus. Mushrooms are one kind of fungus; yeasts are another, and so is mold. Unlike plants, molds don't grow from seeds. They grow from tiny spores that float around in the air. When some of these spores fall onto a piece of damp food, they grow into mold. The tiny black dots that appear on bread after a while are the bread mold's spores. These spores will be released into the air so that more mold can grow. Green plants are green because they contain a chemical compound called chlorophyll. Chlorophyll makes it possible for green plants to use sunlight, air and water to make food (sugars and starches). Unlike green plants, molds have no chlorophyll and can't make their own food. The mold can't turn sun, air and water into food so it eats the bread! The mold feeds itself by producing chemicals that make the bread start to rot. As the bread rots, the mold grows. Nature recycles! That's right, nature is one of the best recyclers around and mold is one of nature's helpers. Although it isn't much fun when our food gets moldy, it's a great help in nature. In a natural environment, rotting things return to the soil, providing nutrients for other plants. Mold is an important part of the circle of life.

After reading:

1. Name three groups of fungi: _____

2. How are molds different from plants?

a. _____

b. _____

3. How does mold wind up on your bread? _____

4. How does mold play an important role in nature? _____

Name _____ Date _____
Protists Reading Comprehension HR _____

1 The protist kingdom (or Kingdom Protista) is made up of one-celled (unicellular) organisms and simple many-celled (multi-cellular) organisms. All protists live in moist surroundings. In general, the protists include organisms whose cells have a nucleus enclosed by a membrane and who do not fit into the other kingdoms.

2 Protists are mostly one-celled organisms. Some make their own food, but most take in or absorb food. Most protists move with the help of flagella, pseudopods, or cilia. Some protists, like the one-celled amoeba and paramecium, feed on other organisms. Others, such as the one-celled euglena or the many-celled algae, make their food by photosynthesis.

3 Many of these protists can be found in a drop of pond or lake water. Because of the diversity of this kingdom, scientists often divide it into animal-like protists, plant-like protists, and fungus-like protists.

4 The animal-like protists must get their food from other organisms. These are often called protozoans. They are able to move to get food. Some move by using pseudopods, or "false feet." Their cell membrane pushes outward in one place, and the cytoplasm flows forward into the bulge. They use pseudopods to move away from bright light or to trap food. They can extend pseudopods on either side and trap a food particle. The food is absorbed into the cell. Amoeba and sarcodines are examples of protists that move by pseudopods.

5 Some animal-like protists move by using cilia. Cilia are hair-like projections that move with a wave-like pattern. The cilia move like tiny oars to sweep food toward the organism or to move the organism through water. An example of these is the paramecium.

6 Zooflagellates are a third type of protists. They are animal-like and move by using flagella. Flagella are whip-like structures that spin quickly, working like a boat's propeller to move the organism through water. Most zooflagellates have from one to eight flagella that help them move. Giardia is a protist that moves with flagella. They can be found in freshwater streams and lakes. People who drink water containing this protist may become sick.

7 Plant-like protists are commonly called algae. Some scientists prefer to classify algae in the plant kingdom. Algae, like plants, can make their own food. Some live in the soil, some in the bark of trees, and some in water. Most of the oxygen in Earth's atmosphere is made by algae living in the oceans. They are an important source of food for other organisms. Giant kelp, one example of the plant-like protists, can grow to one hundred meters long. Giant kelp can form large underwater "forests" where many organisms like sea otters and abalone live. Red tides can occur when a population of algae increases quickly in ocean waters. These algae often make the water appear red but may be brown, green, or colorless. Some algae can secrete poisons that kill ocean animals.

8 Fungus-like protists include water molds, downy mildews, and slime molds. Water molds and downy mildews can attack food crops and fish. Slime molds feed on bacteria and other microorganisms. Like fungi, these fungus-like protists must get food from other organisms. They also use spores to reproduce.

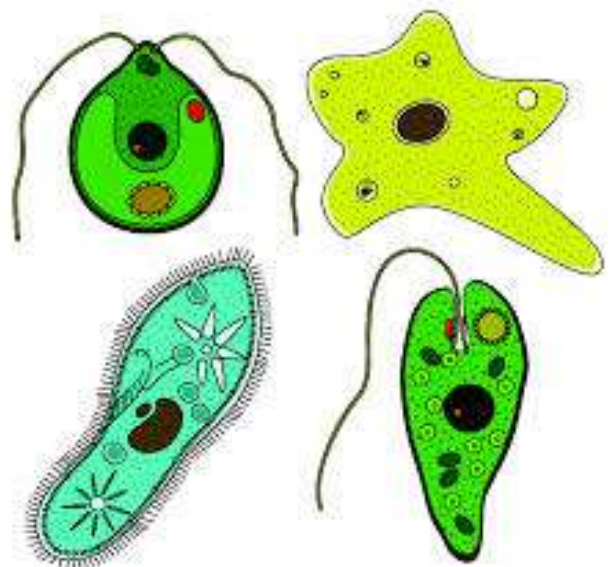
9 Organisms in the Kingdom Protista are very different from each other. They are grouped together partly because they just don't fit into any other kingdom.

1. In general, the Kingdom Protista contains: <input type="radio"/> A Organisms that must get their food from other organisms <input type="radio"/> B Organisms that make their own food <input type="radio"/> C Organisms with a membrane-enclosed nucleus and who don't fit in any other kingdom	2. Most protists move with the help of: <input type="radio"/> A Cilia, flagella, or pseudopods <input type="radio"/> B Euglena and amoeba <input type="radio"/> C Muscles and bones
3. You would find most protists living in: <input type="radio"/> A Antarctica <input type="radio"/> B A moist environment <input type="radio"/> C A desert	4. What does pseudopod mean? <input type="radio"/> A False foot <input type="radio"/> B Making seed pods <input type="radio"/> C False animal
5. What are pseudopods used for? <input type="radio"/> A Moving <input type="radio"/> B Trapping food <input type="radio"/> C Both a and b	6. What are cilia? <input type="radio"/> A Hair-like projections <input type="radio"/> B A type of chemical in the cell <input type="radio"/> C Silly feet
7. What are flagella? <input type="radio"/> A False feet <input type="radio"/> B Whip-like structures that spin quickly <input type="radio"/> C Flags that show protists where to go	

8. _____ Where do Protists mostly live?
- In people's homes, beds, couches and dirty clothes
 - They live in rotten food and moldy cheese
 - In wet places, such as oceans, lakes, ponds, rivers and streams
 - On hairy animals such as bears, dogs, cats, mice and even pigeons

9. _____ Are Protists dangerous?
- Yes, they can cause dangerous diseases like malaria and sleeping sickness
 - No, they are far too small to harm anyone
 - No, they are healthy to eat and are used to kill off bad bacteria in water

10. _____ What does it mean if we say that protists are pathogens?
- Male Protists
 - Parasite Protists
 - Bacteria that eats Protists
 - Dangerous Protists that cause disease



protists

General characteristics:

1. _____

2. _____

Plant-like

Energy source

Examples

Animal-like

Energy source

Examples

Fungus-like

Energy source

Examples



The Amoeba

The **amoeba** is a protozoan that belongs to the **Kingdom Protista**. The name amoeba comes from the Greek word *amoibe*, which means change. Protists are microscopic unicellular organisms that don't fit into the other kingdoms. Some protists are considered plant-like while others are considered animal-like. The amoeba is considered an animal-like protist (**protozoan**) because it moves and consumes its food. Protozoans are classified by how they move, some have cilia or flagella, but the amoeba has an unusual way of creeping along by stretching its cytoplasm into fingerlike extensions called **pseudopodia**. (The word "pseudopod" means "false foot".) When looking at amoeba under a microscope, an observer will note that no amoeba looks the same as any other; the **cell membrane** is very flexible and allows for the amoeba to change shape. Amoebas live in ponds or puddles, and can even live inside people.

There are two types of cytoplasm in the amoeba, 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**. By pushing the endoplasm toward the cell membrane, the amoeba causes its body to extend and creep along. It is also by this method that the amoeba consumes its food. The pseudopodia extend out and wrap around a food particle in a process called phagocytosis. The food is then engulfed into the amoeba and digested by the enzymes contained in the amoeba's lysosomes. As the food is digested it exists in a structure called a **food vacuole**.

Also visible in the amoeba is the **nucleus**, which contains the amoeba's DNA. In order to reproduce the amoeba goes through cell division, 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 amoeba is the **contractile vacuole**, whose job is to pump out excess water so that the amoeba does not burst.

During unfavorable conditions, the amoeba 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 amoeba emerges. Often cysts are created during cold or dry periods where the amoeba could not survive in its normal condition.

Amoebas can cause disease. A common disease caused by the amoeba is called **Amoebic Dysentery**. A person becomes infected by drinking contaminated water. The amoeba 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. Describe how amoebas move.

2. What structure contains the amoeba's DNA? _____

3. How does an amoeba reproduce? _____

4. What term refers to the finger-like extensions of an amoeba's body? _____

What does the term literally mean? _____

5. When ingested through contaminated water, amoebas can cause amoebic dysentery in humans. Which body system is affected by the protist?



The Euglena

Euglenas are unicellular organisms classified into the **Kingdom Protista**, and the Phylum Euglenophyta. All euglena have **chloroplasts** and can make their own food by **photosynthesis**. They are not completely autotrophic though, euglena can also absorb food from their environment; euglenas usually live in quiet ponds or puddles.

Euglena move by a **flagellum** (plural, flagella), which is a long whip-like structure that acts like a little motor. The flagellum is located on the **anterior** (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.

The Euglena is unique in that it is both **heterotrophic** (must consume food) and **autotrophic** (can make its own food). Chloroplasts within the euglena trap sunlight that is used for photosynthesis, and can be seen as several rod-like structures throughout the cell. Euglena also have an **eyespot** at the anterior 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. Euglena can also gain nutrients by absorbing them across their cell membrane, hence they become heterotrophic when light is not available, and they cannot photosynthesize.

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

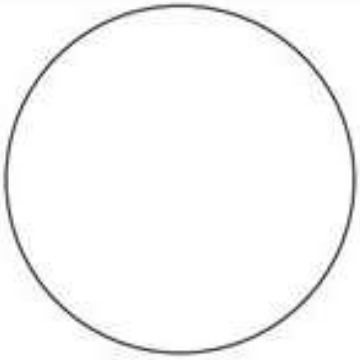
In the center of the cell is the **nucleus**, which contains the cell's DNA and controls the cell's activities. The nucleolus can be seen within the nucleus.

The interior of the cell contains a jelly-like fluid substance called cytoplasm. Toward the posterior 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 take in some much water due to osmosis that the cell would explode.

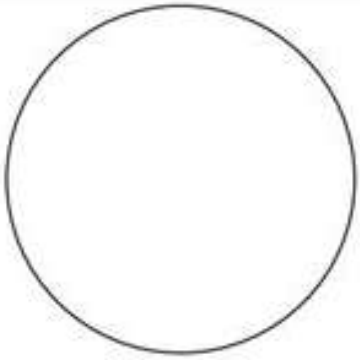
Questions:

1. Are euglena unicellular or multicellular? _____
2. How do euglena move? _____
3. Which organelle in the euglena enables it to perform photosynthesis? _____
4. Define heterotroph: _____
5. Define autotroph: _____
6. Identify two ways in which euglena obtain their food:
 - a) _____
 - b) _____
7. What is the eyespot used for? _____
8. What is the function of the nucleus? _____
9. What would happen to the euglena if it did not have a contractile vacuole? _____

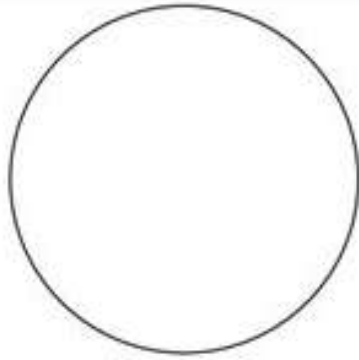
Observing and Estimating the Size of Microscopic Organisms



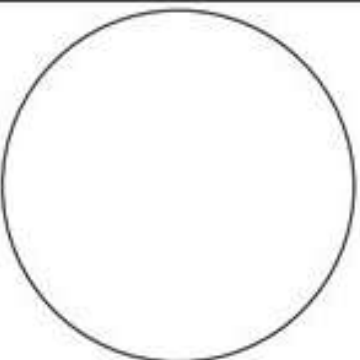
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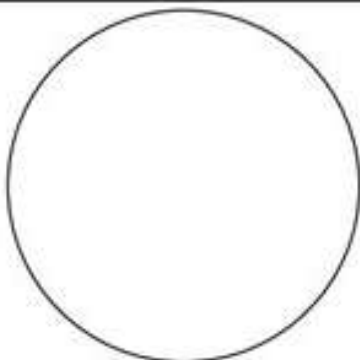
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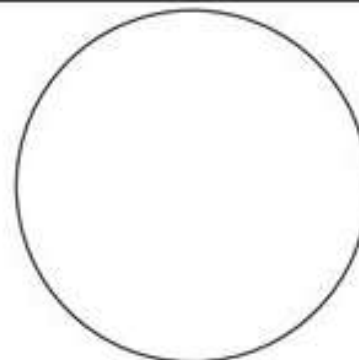
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