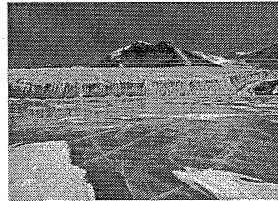
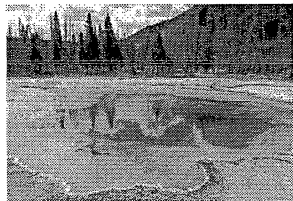


Introduction to Microbiology

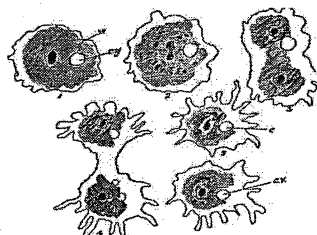
Do you know you have billions of living things crawling all over your body right now? These living things are called microbes or microorganisms. Almost all microbes are harmless and even helpful. The prefix "micro" means tiny or microscopic. The base word "organism" means living thing. So a microorganism is a tiny living thing. We cannot see most of them unless they huddle close together to form clusters or unless they are viewed with the aid of a microscope. They can be so microscopic that hundreds can fit inside the period at the end of this sentence! There can be millions or even billions of them in one place. The study of microorganisms is called microbiology.

Microorganisms have the same requirements for life as other living things do. They need to eat, excrete waste through a cell membrane, breathe oxygen, reproduce, move, grow, and are sensitive to their environment. Most microorganisms prefer a warm, moist, dark environment to live, but there are extreme microorganisms too. These extremophiles live in places where most organisms could not survive. They can thrive living in boiling hot environments like inside hot springs where they cling to the sides. In 2013, extremophiles were found in a frigid, dark lake about a half mile under the ice in Antarctica. Microorganisms can live anywhere and are very adaptable to their environment.

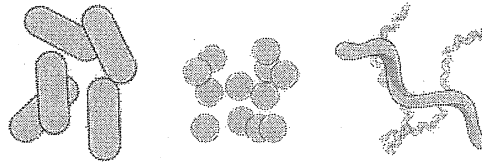


Microorganisms can be single-celled (unicellular) or multi-celled (multicellular). All living things are organized into cells. Cells are the basic structural unit for all living things. In humans, our cells contain a nucleus in the center. Some microorganisms have a nucleus, but others do not. A nucleus is the center and most important part of our cells. If a microorganisms' cells are eukaryotic then the cell has a nucleus. If a microorganisms' cells are prokaryotic then the cell has no nucleus or center.

There are three main types of microorganisms: bacteria, fungus, and protists. Bacteria are the oldest, most diverse, most abundant, and simplest of all the microbes. They were the first microbes to be found on Planet Earth. They are single-celled or unicellular and prokaryotic, so they have no nucleus. They reproduce by binary fission and

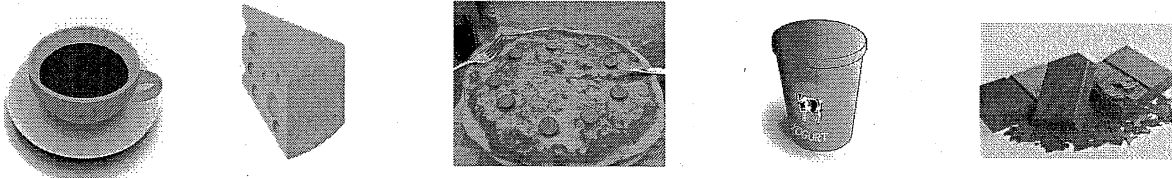


don't need a partner to reproduce or make more copies. The bacteria cell divides or splits itself to make copies. Bacteria have many shapes but the most common are rod, spherical, and spiral shapes.

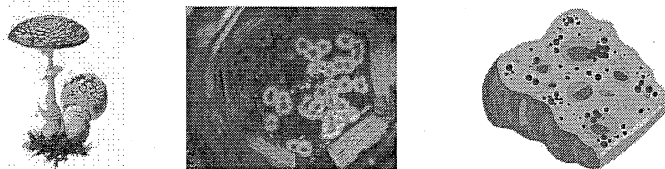


Rod-shaped Sphere-shaped Spiral-shaped

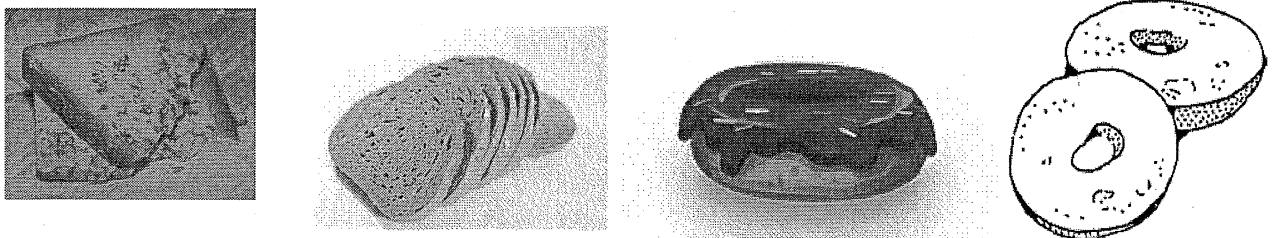
Bacteria are mostly good and helpful. They can clean our water when oil spills occur, help digest food in our digestive tract, and are found in many foods like yogurt, cheese, pickles, pepperoni, sausage, chocolate, wine, and coffee. But some bacteria can make us very sick. Diseases like salmonella (food poisoning), streptococcus (strep throat), E-coli, and staph infections occur due to bacterial infections.



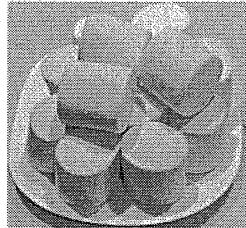
Another common microorganism is fungus. These can live almost anywhere, but they specifically LOVE decomposing or breaking down other living things. They aren't picky eaters and live by absorbing nutrients from dead or decaying organisms. This is why they are considered decomposers. Fungi (plural) are eukaryotic, so they have cells with a nucleus or center. There are over 100,000 species or kinds of fungi known. The most common species are yeast, mushrooms, mold, and mildew. Fungi form in groups called clusters. Fungus can appear fuzzy or furry. They reproduce by sending out spores or by forming buds.



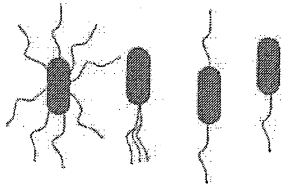
Fungi can be very helpful since they decompose our trash which adds nutrients to our soil. Without fungi, our world would be filled with trash! Yuck! Fungi are also in many foods like soy sauce, yeast (breads), donuts, bagels, mushrooms, moldy cheese, beer, and chocolate. It can cause disease like athlete's foot and ringworm.



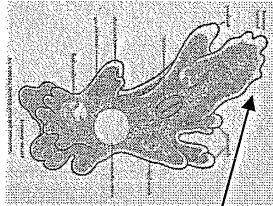
Last, protists are eukaryotic because their cells have a nucleus. This is a massive group and make their own kingdom, the **Protista Kingdom**. They are organized into groups: **protozoa (animal-like)**, **algae (plant-like)**, and **slime molds (fungus-like)**. Protists live in water, so they are **aquatic** microbes. Protists are in foods like sushi, seaweed, ice cream, marshmallows, sour cream, gelatin, and salad dressings. The most common disease is **giardia** which is an intestinal infection.



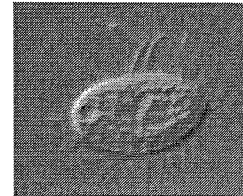
One type of protist is protozoa. **Protozoans** are **single-celled, eukaryotic** protists. They are **consumers** or **heterotrophs** since they eat other things and don't make their own food. Examples of protozoans are 1) **paramecium** 2) **amoeba** and 3) **giardia**. These protists have **appendages** or parts that create movement. Examples of **appendages** are **cilia** (hairs), **flagellum** (a whip-like tail), and a **pseudopod** (a false foot).



Flagellum (1) or flagella (1+)



Pseudopod



Cilia

Algae is a second type of protists that is an **autotroph** or **producers**, so they are green from **chlorophyll** and make their own food through the process of **photosynthesis**. They can be **unicellular** or **multicellular**. Some familiar terms for algae may be kelp or seaweed. Algae can clean dirty water and is found in many products we use daily like fertilizer and toothpaste.

Another category of protists is fungus-like **slime mold**. These are **consumers** or **heterotrophs** and don't move. Although molds are fungi, **slime mold** acts like a fungus but is categorized as a protist.

Welcome to the fascinating world of microbiology where microscopic living creatures come alive! How do microorganisms affect YOUR life?

INTRODUCTION TO MICROORGANISMS

READING QUESTIONS

1. What is the study of microorganisms called? _____
2. Name some requirements for all microorganisms?
 - a) _____
 - b) _____
 - c) _____
 - d) _____
 - e) _____
 - f) _____
 - g) _____
3. What type of an environment do most microorganisms live in? _____
4. Give one example of an extremophile. _____
5. Name the three main categories of microorganisms.
_____/_____/_____
6. A consumer _____
7. A producer _____
8. Fill in the chart:

	Bacteria	Fungus	Protists
Size	single cell (unicellular)	clusters	unicellular or multicellular
Foods			
Benefits			
Diseases			