



PT CODE: S-7-2

## THE HISTORY OF LIFE

**Overview:** Learning about cells and organisms.

There are three parts of this performance task: 1) classroom instruction, 2) partner work, and 3) independent work.

Our bodies are made up of trillions of specialized cells, and many of these cells are bacteria that live in and on our bodies. Cells are the most basic form of life, all sharing a common ancestor and basic functions. The structure of the very first cells was simple. It is thought that the first cells started with **DNA** that was surrounded by a membrane. These early cells developed into a primitive **prokaryote**. Today, prokaryotes include bacteria that live in a wide range of environments, including polar ice, hot springs, and deep-sea volcanic vents. The deep-sea volcanic vents are hot water environments, full of toxic chemicals, similar to the environments in which these early bacteria appeared. Evidence shows that bacteria developed the ability to perform photosynthesis, and these bacteria actually produced enough oxygen over millions of years to change Earth's atmosphere.

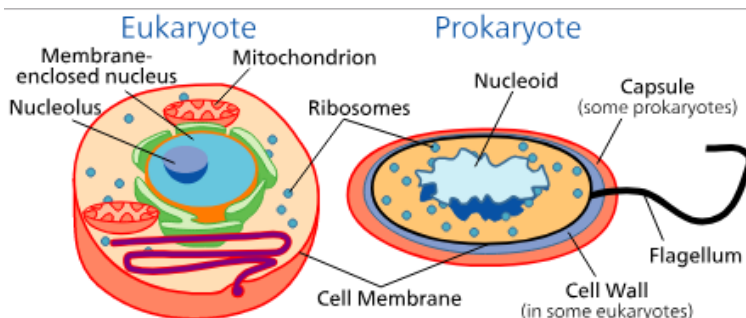
Bacteria reproduce asexually through the process known as binary fission, in which the genetic information of a cell is copied. The cell divides in half, and each of the halves gets one copy of the original genetic material. The DNA of these tiny organisms is capable of producing about 5,000 different **proteins**, which are molecules essential to life. Because bacteria reproduce so quickly and the DNA is easy to manipulate, bacteria are used in medical research and to produce medicines. Bacteria are in our digestive system and aid in breaking down and absorbing food. However, bacteria can be pathogens and cause diseases like strep throat, food poisoning, and tuberculosis.

Unlike bacterial cells, human cells are eukaryotic. Unlike the DNA in prokaryotes, the DNA inside **eukaryotes** is contained inside a nuclear membrane and forms the nucleus of the cell.

Scientists have been especially interested in two organelles found in eukaryotes: mitochondria and chloroplasts. These two organelles are both responsible for energy transformation inside cells. Also, mitochondria and chloroplasts contain their own distinct DNA. Both of these structures are similar in size to bacteria and reproduce like bacteria (asexually).

Some organelles are present in both plant and animal cells, and serve similar functions. **Ribosomes**, for example, are organelles where proteins are made.

Differences between organisms are based on the number of cells that compose the organisms and how they obtain food. **Autotrophs** have the ability to make their own food, while **heterotrophs** cannot make their own food.



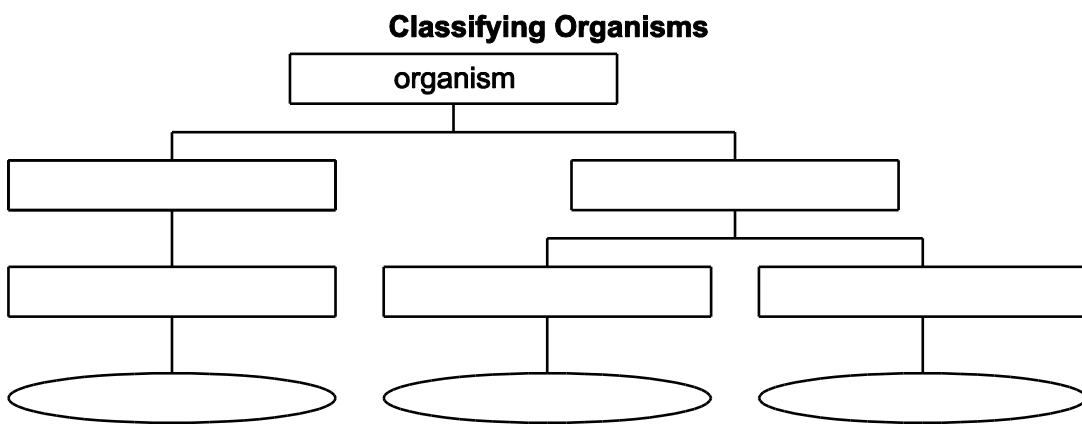


1. Complete the chart by classifying each organism as an autotroph or heterotroph.

Kingdom	Cells and Cell Type	Autotroph or Heterotroph?
plants	multicellular, eukaryotic	
animals	multicellular, eukaryotic	
fungi	multicellular, eukaryotic	
protists	multicellular, eukaryotic	
monera (bacteria)	unicellular, prokaryotic	

✓ **Checkpoint 1:** As directed by your teacher, discuss answers with a partner or as a class.

2. Cells can be classified by their characteristics. A classification model is shown below. Complete the model by writing the words from the word bank in their proper locations in the model. You will use each of the labels only once.







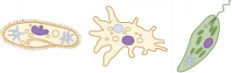
**Word Bank**

- protists
- prokaryote
- eukaryote
- unicellular
- unicellular
- bacteria
- multicellular
- fungi, plants, animals

✓ **Checkpoint 2:** As directed by your teacher, discuss answers with a partner or as a class.

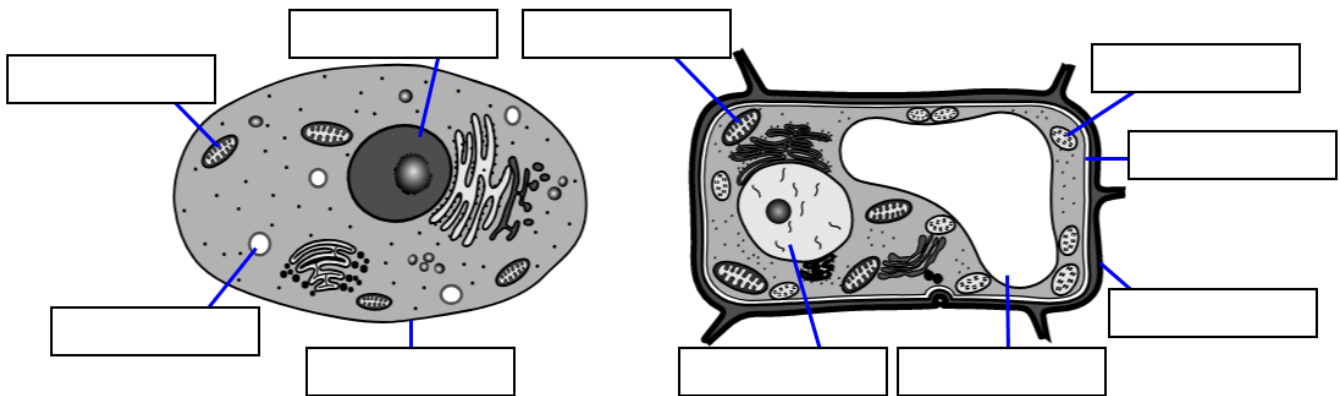


3. Add check marks to the chart to show which organelles may be present in organisms from each kingdom.

	Kingdom				
	Animal	Plant	Fungi	Bacteria	Protist
					
nucleus					
cell membrane					
cell wall					
chloroplasts					
vacuole					
mitochondrion					

✓ **Checkpoint 3:** As directed by your teacher, discuss answers with a partner or as a class.

4. The diagrams below model eukaryotic plant and animal cells. Label each model as either a plant or an animal cell. Then, label the indicated organelles within each cell from the list in the chart above.



Type of Cell \_\_\_\_\_

Type of Cell \_\_\_\_\_



5. The chart below describes six organelles found within prokaryotic and/or eukaryotic cells. Complete the chart.

Organelle	Found in Prokaryotic or Eukaryotic Cells?	Function
nucleus		
	eukaryotic	
		converts solar energy to chemical energy
		provides rigid shape
		water storage
cell membrane		

✓ **Checkpoint 4:** *As directed by your teacher, discuss answers with a partner or as a class.*

*The next activity is designed to help you better understand the development of cells and their features. You will complete part of this activity with a partner and part of it as an individual.*



Student Name \_\_\_\_\_

**ACTIVITY: Modeling Cells**

6. Obtain a cell model bag from your teacher. Record the bag number in the space provided. Each bag contains materials to make a model that represents either a plant or an animal cell. Sort through the materials and determine which material is best to represent each of the organelles within your cell. After your model is assembled, complete the chart below.

My group was given the materials to build a plant / an animal cell. (circle one) Bag number: \_\_\_\_

Organelle	Material	Explanation for Selecting This Material as This Cell Organelle

**Clean up your materials and read the paragraph below. Then, work independently on the application questions on pages 6 and 7.**

Over time, multicellular organisms started to take on different roles to keep the organism alive. Cell specialization led to a change from colonies of unicellular organisms to multicellular organisms. This specialization and the beginning of sexual reproduction led to the complexity and diversity of present-day plants and animals. Structural organization is made up of cells, tissues, organs, organ systems, and organisms.



**Application Questions** (to be done on your own) **Student Name** \_\_\_\_\_

7. Probiotics are live bacteria and yeasts that are naturally found in humans. Probiotics can also be found in some foods and can be taken as supplements in pill form. Doctors often prescribe probiotic supplements for patients with digestive problems.

Explain why probiotics can be helpful to humans. \_\_\_\_\_

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8. Describe a possible positive and negative effect of the use of antibiotics by humans.

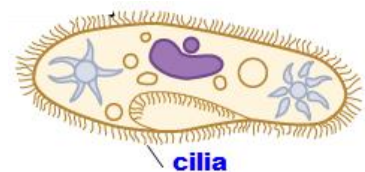
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9. Paramecia are protists that use cilia for movement.  
The diagram shows a typical paramecium.



Based on the structural organization of organisms, are the cilia of the paramecium an organelle, a cell, a tissue, or an organ? \_\_\_\_\_

Explain your answer. \_\_\_\_\_

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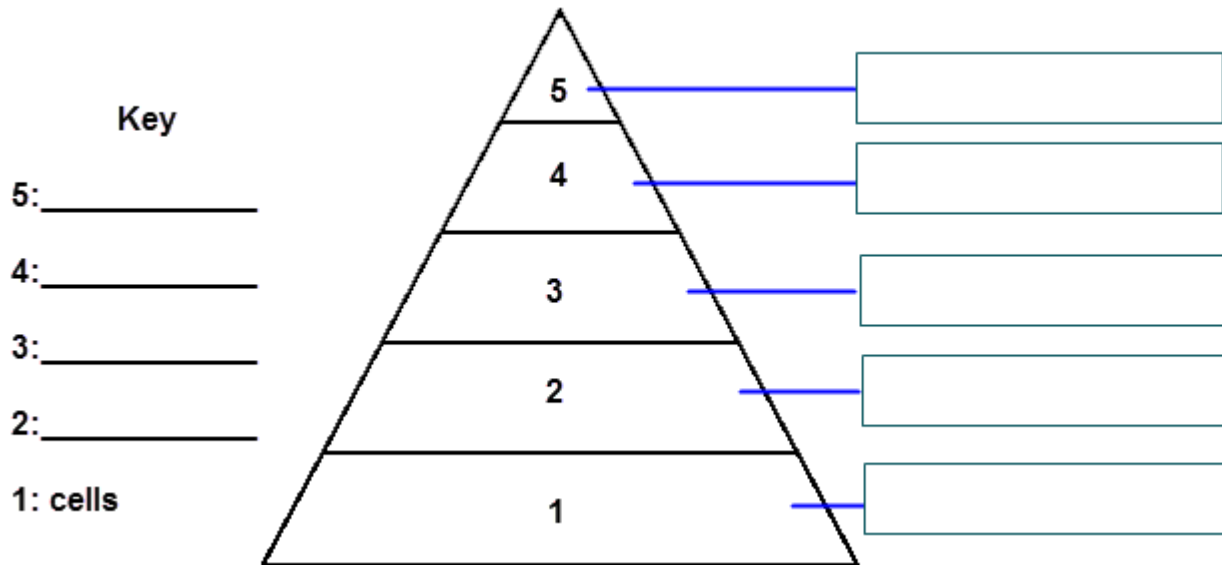
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10. Construct a model showing how the structures within the digestive system are organized. Use the terms in Word Bank 1 for the left side of the model, and the terms in Word Bank 2 for the right side of the model.



**Word Bank 1**

- tissues
- organism
- organs
- organ system

**Word Bank 2**

- digestive system
- intestines
- human body
- squamous cell
- epithelial tissue

11. Millions of bacteria live in the human intestines. Occasionally, these populations become imbalanced when a human consumes something that is beneficial to one type of bacteria but harmful to another. The result is often diarrhea: loose, watery waste material that is excreted from the body in an attempt to rebalance the bacteria populations living in the intestines.

Explain how probiotics affect the function of two body systems that work together.

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