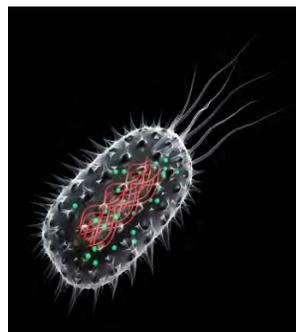




Name: \_\_\_\_\_ Date: \_\_\_\_\_ Per: \_\_\_\_\_

## READING SCIENCE!

### Prokaryotic and Eukaryotic Cells



- 1** Cells, the basic unit of life, are found in every living organism on Earth. Each individual cell is a complex system that performs specific functions and roles. Some organisms are multicellular, made of many different types of cells. Other organisms are unicellular, made of a single cell. It is important to note that whether the cell comes from a unicellular or multicellular organism, all living biological cells share certain characteristics. All cells are bound by a plasma membrane. Within that membrane, all cells contain a cytoplasmic solution known as cytosol. Cytosol is semi-fluid and is where organelles are found. Finally, all cells contain ribosomes, which are responsible for building proteins. However, there are also major differences between cells. There are two major categories of cell types: prokaryotic and eukaryotic cells.
- 2** Prokaryotic cells are found in domains Eubacteria and Archaea. They have very simple structure with no membrane-bound organelles. The genetic material in prokaryotic cells, the DNA, is found in a single, unbound chromosome in a region called the nucleoid within the cytosol. There is no membrane acting as a boundary between the DNA and the rest of the cytosol. Prokaryotic cells are surrounded by a cell wall. These cells types usually reproduce asexually. Most prokaryotic organisms are unicellular.
- 3** Eukaryotic cells are found in the domain Eukaryote. They are usually much more complex than prokaryotic cells. These cells usually have many membrane-bound organelles, each with its own specific structure and function. The genetic material in eukaryotic cells can be found on chromosomes within a true nucleus that is separated from the rest of the cell with a boundary formed by a membrane. Some eukaryotic cells, such as those found in plants, fungi, and some protists, have cell walls outside their plasma membranes. These cell types usually reproduce through the processes of meiosis and mitosis. Most eukaryotic organisms are multicellular.



- 4 One of the most obvious differences between prokaryotic and eukaryotic cells is their size. Eukaryotic cells are much larger than prokaryotic cells, with some eukaryotic cells even being visible to the naked eye. How large is this difference? On average, eukaryotic cells are ten times larger than prokaryotic cells. To give you a size reference, if an average prokaryotic cell were the size of a pea, then an average eukaryotic cell would be about the size of a medium grapefruit. In this case, a pea would be roughly 1 cm in diameter and a grapefruit would be roughly 10 cm in diameter.
- 5 Because of this great difference in size, prokaryotic and eukaryotic cells have different ways to carrying on chemical processes such as breaking down sugars for energy or moving materials through the cell. Materials in prokaryotic cells mainly move by diffusion. This random movement is fast enough to spread chemicals over short distances. Enzymes that help prokaryotes carry on chemical processes can be attached to the inside of the cell membrane.
- 6 In larger eukaryotic cells, using only diffusion to move materials is not fast enough. A eukaryotic cell that is ten times bigger than a prokaryote has up to 1000 times the volume of cytosol. This bigger volume requires much more organization. Specific membrane-bound organelles do separate jobs such as moving materials across the cell. Endoplasmic reticulum acts as a transportation system for eukaryotic cells. Materials made in the cell are carried to specific places in the cell along its membranes. The difference between using diffusion and the membranes of the endoplasmic reticulum is like using bicycles or cars to move people around a small town compared to the using mass transit in a large metropolitan area like Houston, Chicago, or New York City.
- 7 Other life functions in eukaryotic cells take place inside of other membrane-bound organelles as well. Mitochondria, Golgi bodies, vacuoles, lysosomes, and chloroplasts can be found in eukaryotic cells. Their details may not be visible with a light microscope, but you can see them in a stained cell.
- 8 Biological cells cannot usually be seen without magnification, so how are cell types identified and measured? When trying to determine whether a cell is prokaryotic or eukaryotic, place the sample on a microscope slide and look through the microscope lens on low-power of 40x then medium-power of 100x. If any details of the sample can be observed at medium-power, it is most likely a eukaryotic cell. Most prokaryotic cells cannot be seen without the high-powered lens due to their incredibly small size. The next time you observe cells, see how easily you are able to distinguish between prokaryotic and eukaryotic cells based solely on size.



**1** Paragraph one talks about how all cells share certain characteristics. Which of the choices below is not one of the shared properties?

- A** Bound by a plasma membrane containing cytosol
  - B** Cytosol and organelles
  - C** Found in the domains Eubacteria and Archaea
  - D** Contain ribosomes
- 

**2** What cell type has no membrane-bound organelles, has a single unbound chromosome, and is very small?

- A** Eukaryotic cell
- B** Prokaryotic cell
- C** Animal cell
- D** Plant cell



**3** You are looking through a light microscope with a 10x eyepiece trying to determine what type of cells you are seeing. You can only see individual cells with 100x total magnification. What type of cell is it, and how much detail would you expect to see?

- A** Prokaryotic cell, very little detail
  - B** Prokaryotic cell, much detail
  - C** Eukaryotic cell, very little detail
  - D** Eukaryotic cell, much detail
- 

**4** You are looking under a microscope at stained cells that appear to have a stiff outer edge and a smaller structures inside including a large rounded object near the center. What type of cell would you expect these cells to be, and why?

- A** Prokaryotic, because only prokaryotic cells have cell walls.
- B** Prokaryotic, because prokaryotic cells have ribosomes inside.
- C** Eukaryotic, because only eukaryotic cells have cell walls.
- D** Eukaryotic, because it has larger organelles other than ribosomes inside.



- 5** Which structure would not be found in both prokaryotic and eukaryotic cells?
- A** Cytosol
  - B** Mitochondria
  - C** Ribosomes
  - D** Plasma membrane
- 
- 6** Prokaryotic and eukaryotic cells have several differences. Which statement below is not one of those differences?
- A** Prokaryotic cells are found in the domains Eubacteria and Archaea.
  - B** Eukaryotic cells have organelles for processes like respiration or photosynthesis.
  - C** Prokaryotic cells are not bound by a plasma membrane.
  - D** Eukaryotic cells are generally ten times larger than prokaryotic cells.

