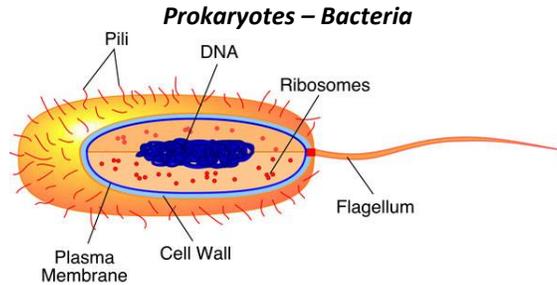


Evidence 1: Cell Comparison Regular

Option 2: Reading

Prokaryotes

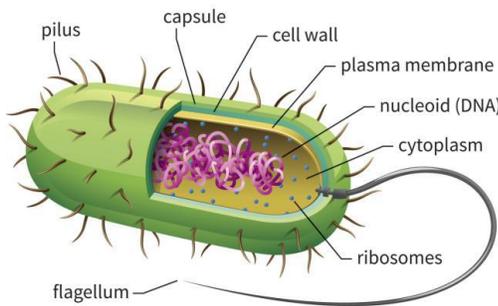


Prokaryotes, which includes, bacteria are the simplest of all the cells. All prokaryotes have a single, circular chromosome and lack a nucleus and membrane-bound organelles. There are two major groups of prokaryotic organisms --- the Kingdom **Eubacteria** and the Kingdom **Archaeobacteria**. Eubacteria are known as true bacteria and in Domain Bacteria. They are the most common type of prokaryote. They are found everywhere, on surfaces and in the soil. **Archaeobacteria or the ancient bacteria** are found in extreme environments, like hot sulfur springs and thermal vents in the ocean floor. They belong to the domain **Archaea**. Archaeobacteria are thought to be some of the oldest life forms on earth.

1. What characteristics do all prokaryotes have in common? _____
2. What is the best known prokaryote and where can they be found? _____
3. Name the 2 kingdoms for prokaryotes.

4. Name the 2 bacterial domains.

5. Where are the bacterial members of the domain Archaea found? _____
Give an example. _____
6. What are thought to be the oldest organisms on Earth?



Some bacteria such as the **cyanobacteria** contain chlorophyll and can make their own food. Most bacteria are **heterotrophic** and don't make their own food (autotrophic). That means they have to rely on other organisms to provide them with food. Some bacteria such as the **cyanobacteria** contain chlorophyll and can make their own food. These bacteria have to break down, or **decompose**, other living things to obtain energy. Very few bacteria cause illness. Some bacteria are used to make food, such as cheese and yogurt. Scientists have genetically engineered a type of bacteria that breaks down oil from oil spills. Some bacteria like **E.coli**, live inside the guts of animals and help them to digest food.

7. Are all bacteria heterotrophic? _____ Explain.

8. What bacteria lives in our gut to help digest food?

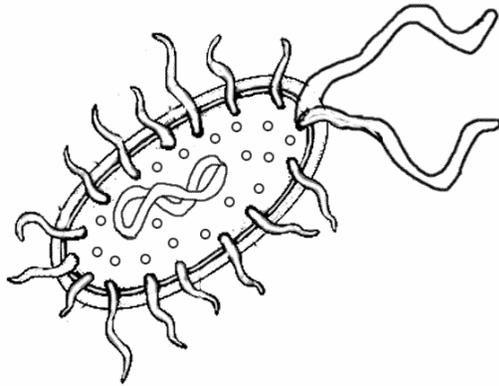
9. How do heterotrophic bacteria get food and how does this benefit the ecosystem? _____

10. Name several food products made with the help of bacteria. _____

11. Give an example of a photosynthetic bacterium.

12. What does autotrophic mean?

Bacteria are unicellular and are covered with a thick outer **cell wall**. **Color and label** the **cell wall PURPLE**. Just within the cell wall is the cell membrane. **Color and label** the **cell membrane PINK**. Along the surface of some bacteria are structures called **pili** (**pilus**-singular) that help bacteria adhere to surfaces. **Color and label** all the **pili LIGHT GREEN**. Some bacteria are **motile** (can move). Many of these bacteria have long, whip like structures called **flagella** (**flagellum**-singular). **Color and label** the **flagella DARK GREEN**. Since bacteria are prokaryotes, they do



NOT have a nucleus. They do have a single strand of **DNA** (double helix), their chromosome is in a circular shape in the **nucleoid region** (center of the cell). This single strand of DNA contains all the instructions for making more bacterial cells. Locate the **DNA** and **color and label** it **YELLOW**. Bacterial cells reproduce by a process called **binary fission**. The inside of the bacterial cell is filled with cytoplasm. **Color and label** the **cytoplasm LIGHT BLUE**. Sprinkled throughout the cytoplasm of the cell are small, round structures called **ribosomes**. Ribosomes make proteins for the cell. **Label and Color** all of the **ribosomes RED**.

13. Name two structures that aid bacteria in movement.

14. What covers the outside of all prokaryotes?

15. What is the function of pili?

16. What structures, if present, let bacteria be motile?

17. Describe the Chromosome (DNA) of bacteria & tell its location.

18. What is the purpose of ribosomes?

Eukaryotes

Eukaryotic cells are more complex than prokaryotic cells. They all have a **cell membrane**, **ribosomes**, and **DNA** as prokaryotic cells do. However, the DNA of eukaryotic cells does not float freely in the cytoplasm. Instead, it is a linear structure found in the **nucleus**, an internal compartment bound by a cell membrane. The nucleus is one kind of organelle found in eukaryotic cells. **Organelles** are structures that perform specific functions. Most organelles are surrounded by a membrane (**membrane bound**). Some organelles have membranes that form channels which help transport substances from one part of the cell to another part of the cell.

Eukaryotes are organisms made of one or more eukaryotic cells. The earliest eukaryotes, like the first prokaryotes, were single-celled organisms. They arose about 1 billion years later than the earliest prokaryotes. Later, multicellular eukaryotes arose. Every type of multicellular organism that exists is made up of eukaryotic cells. Eukaryotic cells are found in all organisms in Kingdom Protista, Kingdom Fungi, Kingdom Plantae and Kingdom Animalia. The only living organisms that are not eukaryotes are bacteria (they are prokaryotes).

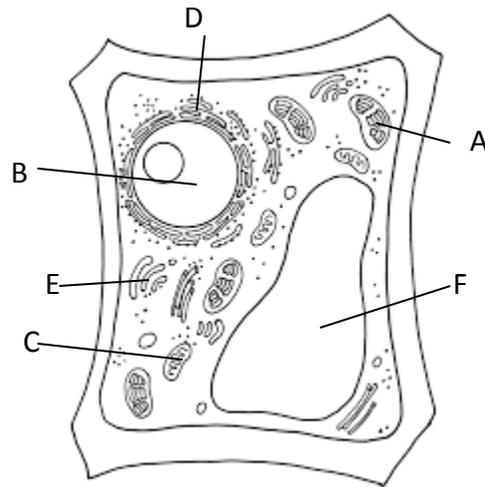
19. What are the organelles in eukaryotes surrounded (bounded) by that is not seen in prokaryotes?

20. How does the DNA in eukaryotes differ from that in prokaryotes?

21. What is an organelle?

22. What organelles are found in BOTH prokaryotes and eukaryotes?

Color the organelles of the eukaryotic plant cell below. Color the (A) **chloroplast** green, the (B) **nucleus** red, the (C) **mitochondria** blue, the (D) **endoplasmic reticulum** orange, the (E) **Golgi** yellow and the (F) large **vacuole** purple



Review: Viruses (not cellular)

All **viruses** contain **nucleic acid**, either DNA or RNA (**but not both**), and a **protein coat**, which encases the nucleic acid. Some viruses are also enclosed by an envelope of fat and protein molecules. In its infective form, outside the cell, a virus particle is called a **virion**. Viruses are not of a cellular structure and therefore not living. They rely on living cells to reproduce.

Bacteriophage Structure

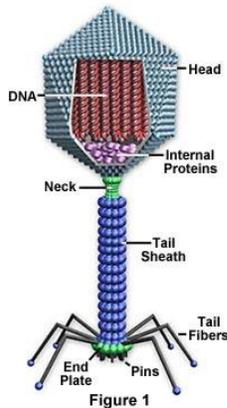


Figure 1

Animal Virus Structure

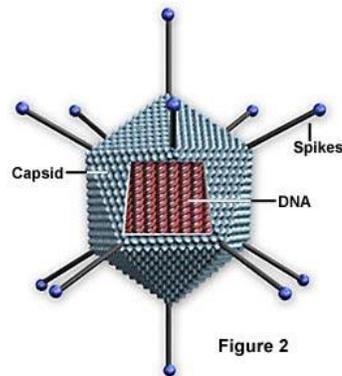


Figure 2

23. What do viruses contain that living cells contain?

24. Can viruses have BOTH DNA and RNA like living cells?
