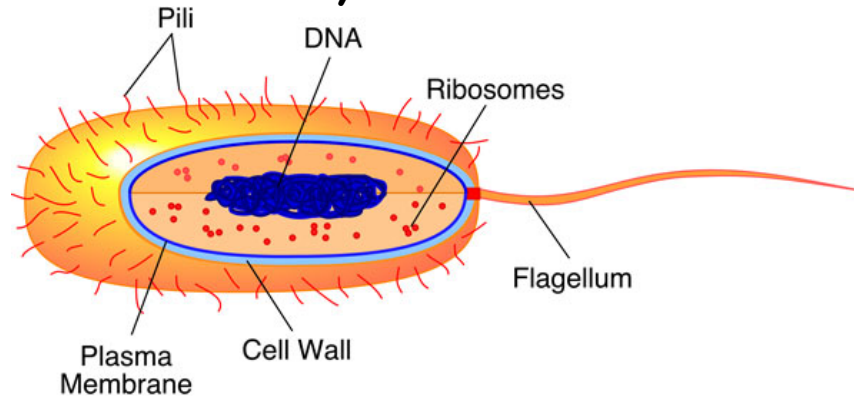


## Prokaryotes - Bacteria



**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. 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?

Most bacteria are **heterotrophic** and don't make their own food. 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 your answer.

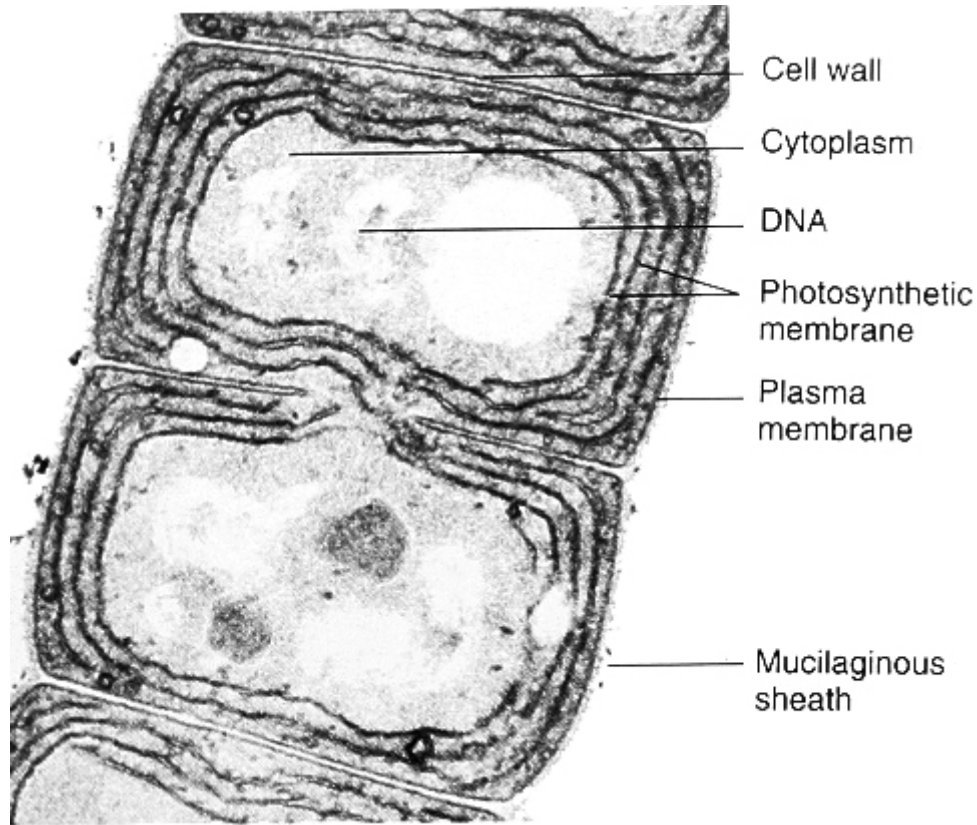
8. What bacteria lives in our gut to help digest food?

9. What is the function for most bacteria and how is this helpful to them?

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

11. Give an example of a photosynthetic bacterium.

Color code the **cell wall** of this cyanobacterium **BROWN**, the **cytoplasm** **YELLOW**, the **DNA** color **RED**, the **photosynthetic membranes** **GREEN**, and the **sheath** **BLACK**.

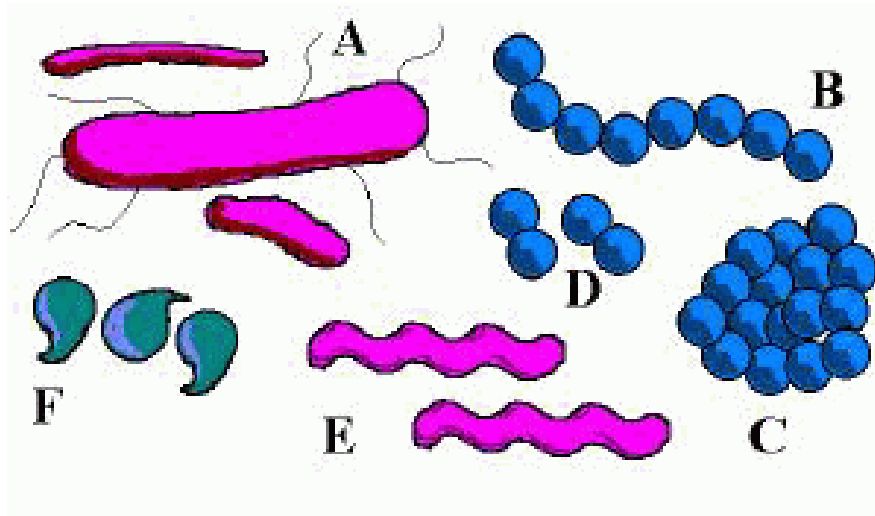


**CYANOBACTERIA**

Most bacterial species are either **spherical**, called **cocci** (*sing. coccus*, from Greek *kókkos*, grain, and seed) or **rod-shaped**, called **bacilli** (*sing. bacillus*, from Latin *baculus*, stick). **Elongation is associated with swimming**. Some rod-shaped bacteria, called **vibrio**, are slightly curved or **comma-shaped**; others, can be **spiral-shaped**, called **spirilla**, or **tightly coiled**, called **spirochaetes**. A small number of species even have tetrahedral or cuboidal shapes. More recently, bacteria were discovered deep under the Earth's crust that grow as long rods with a star-shaped cross-section. The **large surface area to volume ratio** of this morphology may give these bacteria an **advantage in nutrient-poor environments**. This wide variety of shapes is determined by the bacterial cell wall and cytoskeleton, and is important because it can influence the ability of bacteria to

acquire nutrients, attach to surfaces, swim through liquids and escape predators.

Name each of these bacterial shapes.



12. List and describe the 3 basic shapes for bacteria.

A.

B.

C.

13. What is the advantage of having an elongated shape?

14. Name and describe 3 variations of spiral shaped bacteria.

A.

B.

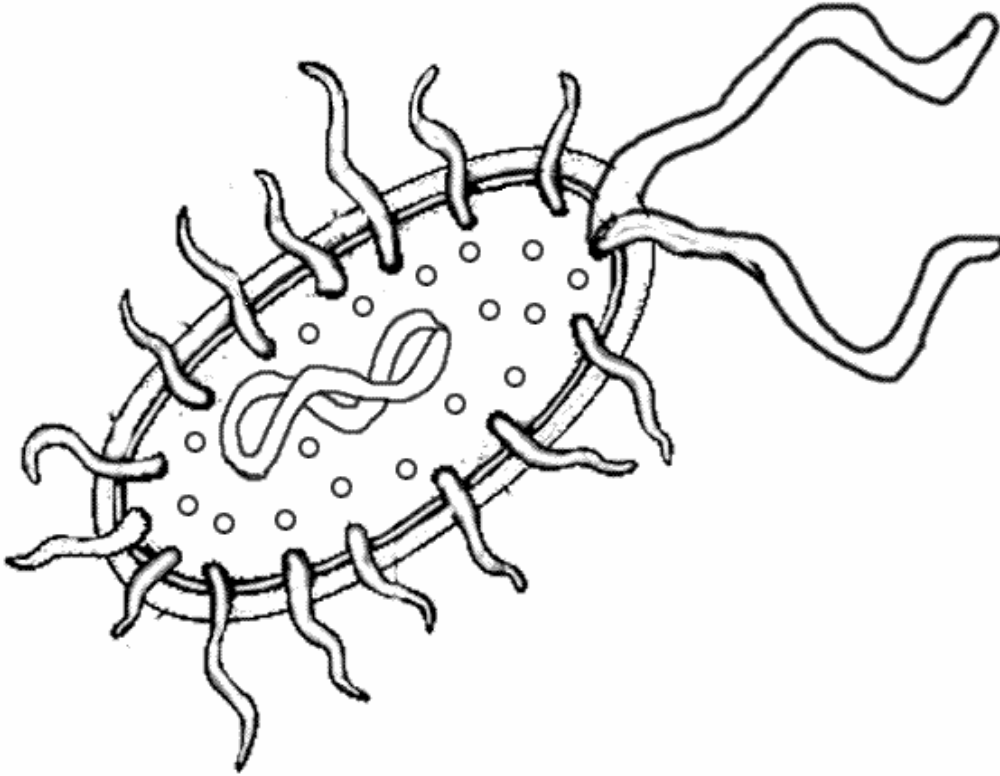
C.

15. What two parts of a bacterium determine its shape?

16. What is the advantage to having a larger surface area to volume ratio?

17. Describe the most recently discovered bacterial shape.

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, 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**.



18. Name two structures that aid bacteria in movement.

19. What covers the outside of all prokaryotes?

20. What is the function of pili?

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

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

23. What is the purpose of ribosomes?