What Are the Domains of Life?

Chapter 2 Lesson 2
Part 1

ByDesign Science, Level 5
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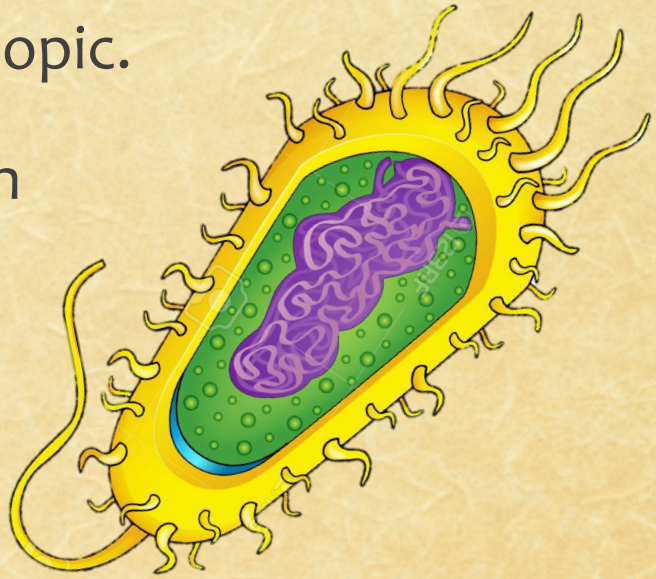
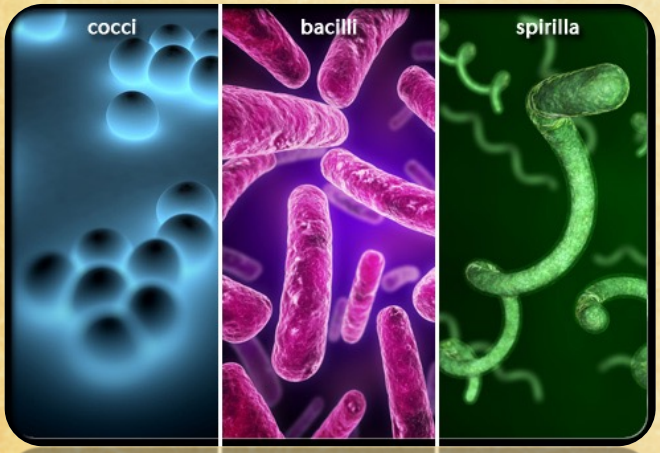
Two Kinds of Cells: Prokaryotes

- A **prokaryote** is a unicellular organism without a nucleus.
- The DNA floats freely in the cell.
- Most prokaryotes are microscopic.
- They use asexual reproduction and cell division to make new cells.



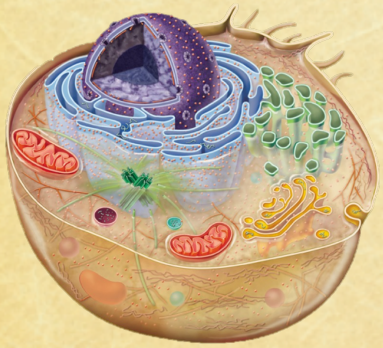
Two Kinds of Cells: Prokaryotes

- The DNA in a cell divides into two parts, and two new cells are created by cell division.
- These cells continue to divide and sometimes form colonies.



- Prokaryotes are shaped like balls, sticks, or spirals.
- All prokaryotes belong to the Archaea and Bacteria domains.

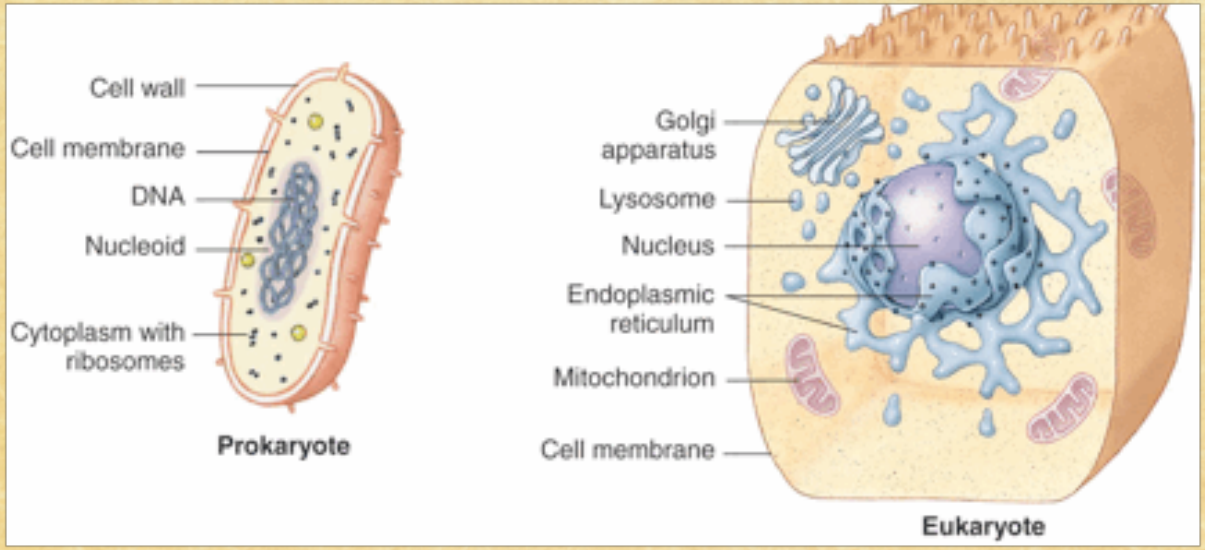
Two Kinds of Cells: Eukaryotes



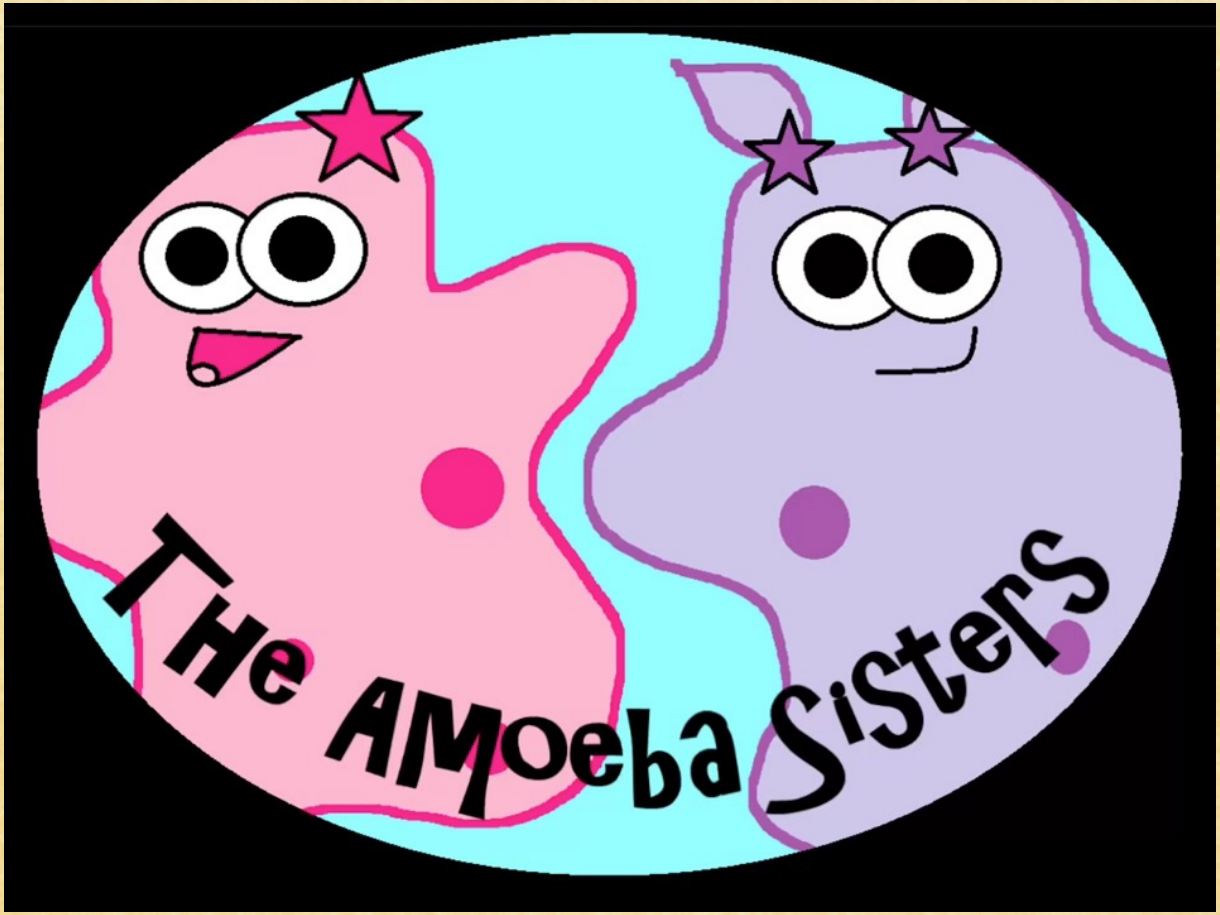
- An **eukaryote** is an organism with one or more cells that have a nucleus surrounded by a membrane.
- Inside the nucleus are chromosomes with DNA.
- The nucleus is the most important difference between these cells and prokaryotic cells.

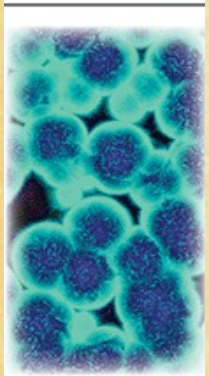
Two Kinds of Cells: Eukaryotes

- In addition, eukaryotic cells contain organelles with membranes, and they are usually larger than prokaryotic cells.
- They use sexual reproduction and cell division to make new cells.



Two Kinds of Cells



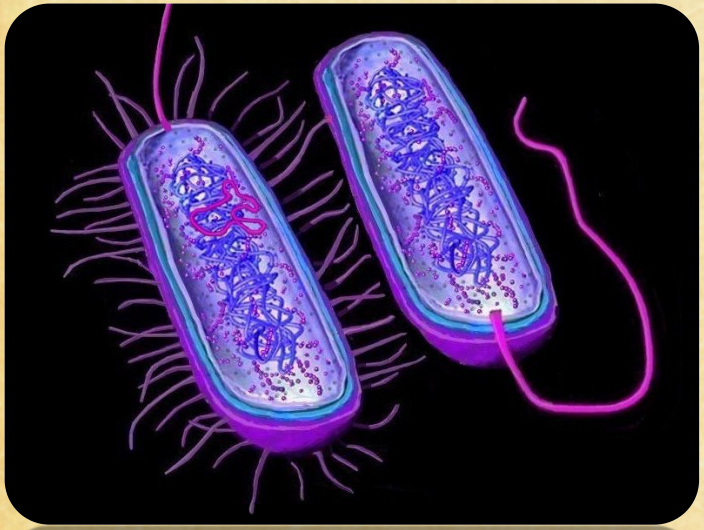


Three Domains of Organisms

- For many years, scientists group all living organism into five kingdoms.
- Then, after discovering new facts while studying bacteria, scientists proposed a three-domain classification system.
- The three domains of living organisms– Archaea, Bacteria, and Eukarya – are then organized into six kingdoms.

Three Domains of Organisms: Archaea

- Imagine living in a place with temperatures as high as 230°F or under polar ice caps with temperatures below freezing.



- **Archaea** is a domain of microscopic organisms that live in these, and other extreme environments.

Three Domains of Organisms: Archaea

- Characteristics of organisms in this domain include:
  - Microscopic
  - Unicellular
  - Prokaryotic
  - Lack of nucleus
  - Live all over the world
  - Shaped like sticks, balls, triangles, and squares.

Three Domains of Organisms: Archaea

- Two main features distinguish Archaeans form other organisms.

- First, they do not depend on the Sun for energy.
- They obtain energy from chemical sources, such as sulfur and other chemicals.

Three Domains of Organisms: Archaea

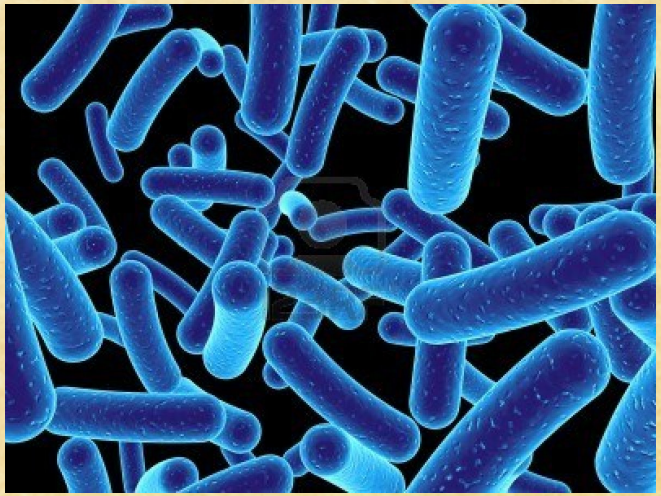
- Second, many live in extreme environments and are often called *extremophiles*.
- Archaea have been found in volcanic vents on the ocean floor, in glaciers, and in water that is 10 times saltier than the ocean.
- They also live in swamps, marches, and inside other animals, even you!

Three Domains of Organisms: Bacteria

- **Bacteria** is another domain of unicellular organisms.
- Bacteria and Archaea share many similar characteristics, such as:
  - Microscopic
  - Unicellular
  - Prokaryotic
  - Lack a nucleus
  - Lives all over the world (except in extreme environments)
  - Shaped like sticks, balls, and spirals.

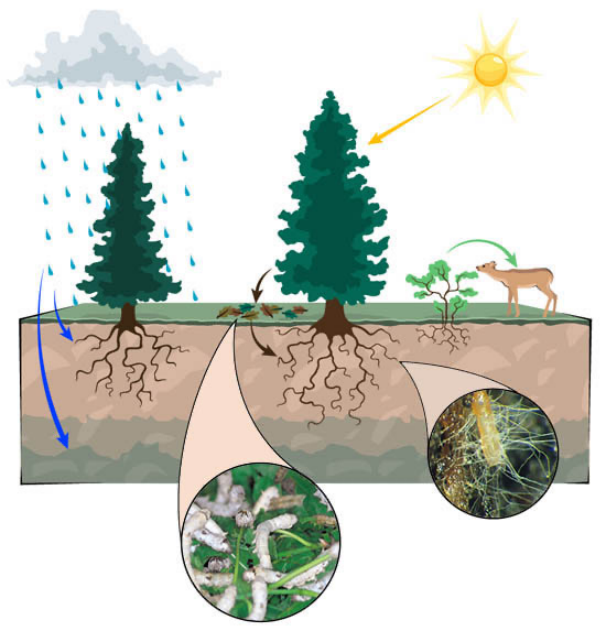
Three Domains of Organisms: Bacteria

- While Bacteria and Archaea seem to be similar, they differ in the structure of the cell walls and cell membranes.
- Bacteria obtain their energy through photosynthesis and respiration.
- They also live in less harsh environments than Archaea.



Three Domains of Organisms: Bacteria

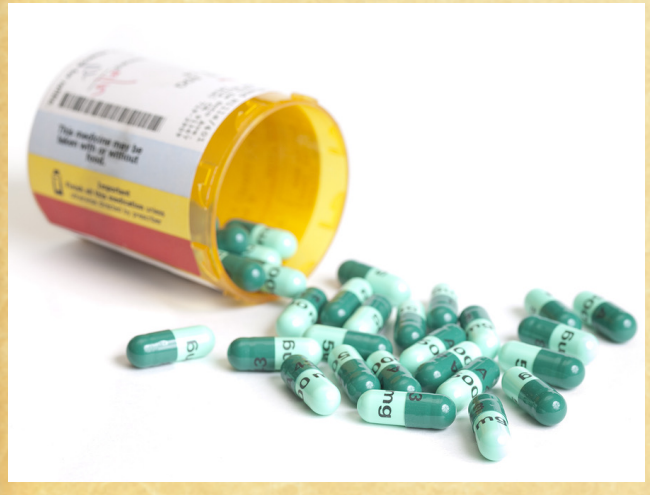
- Most bacteria are beneficial.
- They help to maintain healthy ecosystems.



- They help to produce many of the foods we eat, such as cheese and yogurt.
- They also remove nitrogen from the air and put into the soil to help plants grow.

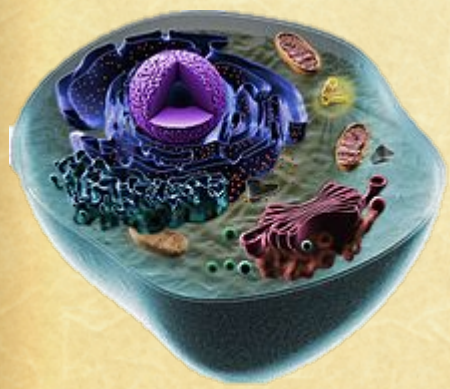
Three Domains of Organisms: Bacteria

- While many bacteria are beneficial, there are some, call *pathogens*, that cause disease and infections in other organisms.
- If used properly, antibiotics can help your body fight these bacteria.



- When taking antibiotics for an illness or infection, it is important to remember to take all of the medicine prescribed, even if you think that you do not need to take it any more.

Three Domains of Organisms: Eukarya



- Eukarya is a domain of organisms that have eukaryotic cells, cells that have a nucleus.
- Their cells, like all cells, are complex and show evidence of the Creator's design.
- Some of the eukaryotic organisms are microscopic and unicellular.
- But, most organisms in this domain are multicellular, and are large enough to see with your unaided eyes.

Three Domains of Organisms: Eukarya

- The Eukarya domain includes four kingdoms.
- The largest is the **animal kingdom** with more that one million known species.
- Animals are multicellular and range in size from tiny insects to blue whales.

Three Domains of Organisms: Eukarya

- The second largest kingdom in this domain is the plant kingdom with about 250,000 species.
- Plants are multicellular and most can make their own food.
- Plants range in size from tiny mosses to giant redwood trees.

Three Domains of Organisms: Eukarya

- The fungi kingdom includes mushrooms, yeasts, mold, and mildews.
- Fungi can be multicellular or unicellular.
- Some people think fungi look like plants.

- But they are not plants, and they cannot make food.

Three Domains of Organisms: Eukarya

- The protists kingdom includes all of the microscopic, unicellular organisms that are not members of Archaea or Bacteria.
- This kingdom also includes microscopic and macroscopic organisms, such as amoebas, diatoms, algae, and seaweeds.

Three Domains of Organisms

Domains and Kingdoms of Life