# Chapter 21-2 Bacteria

**Seven differences between eukaryotes and bacteria**

1. Internal compartmentalization- no nucleus, compartments

2. Cell size- they are 1 um, most eukaryotes are 10X that size

3. Mulitcellularity- single cells

4. Chromosomes- bacterial chromosomes are a single circular piece

5. Reproduction-bacteria reproduce by binary fission (pulling themselves into two pieces)

6. Flagella- if they have a flagella it is single protein fiber

7. Metabolic diversity- can perform anaerobic and aerobic function

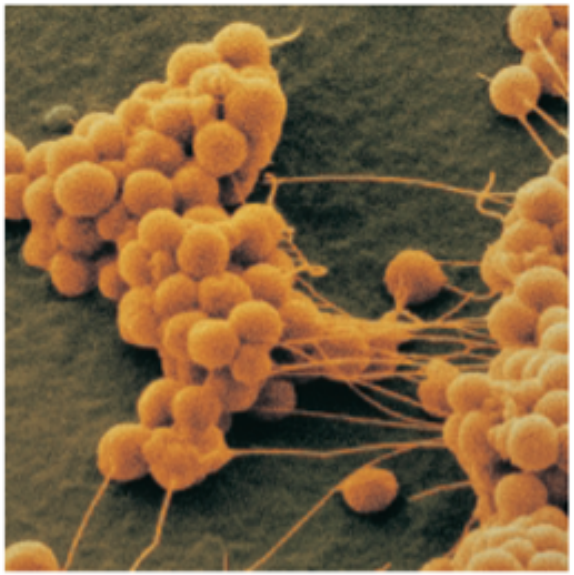
**Three basic shapes**

Bacillus- rod shaped

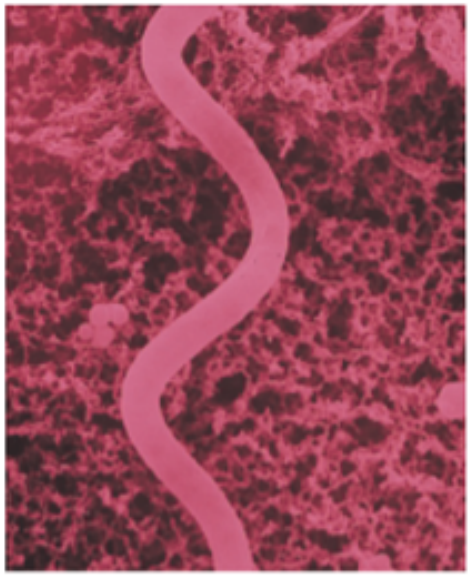
Coccus-round shaped

Spirillum- spiral cell

Bacillus *(Pseudomonas)*



Coccus *(Staphylococcus)*



Spirillum *(Spirillum)*

Strepto- are a species that form strands

Staphylo-  are a species form clusters

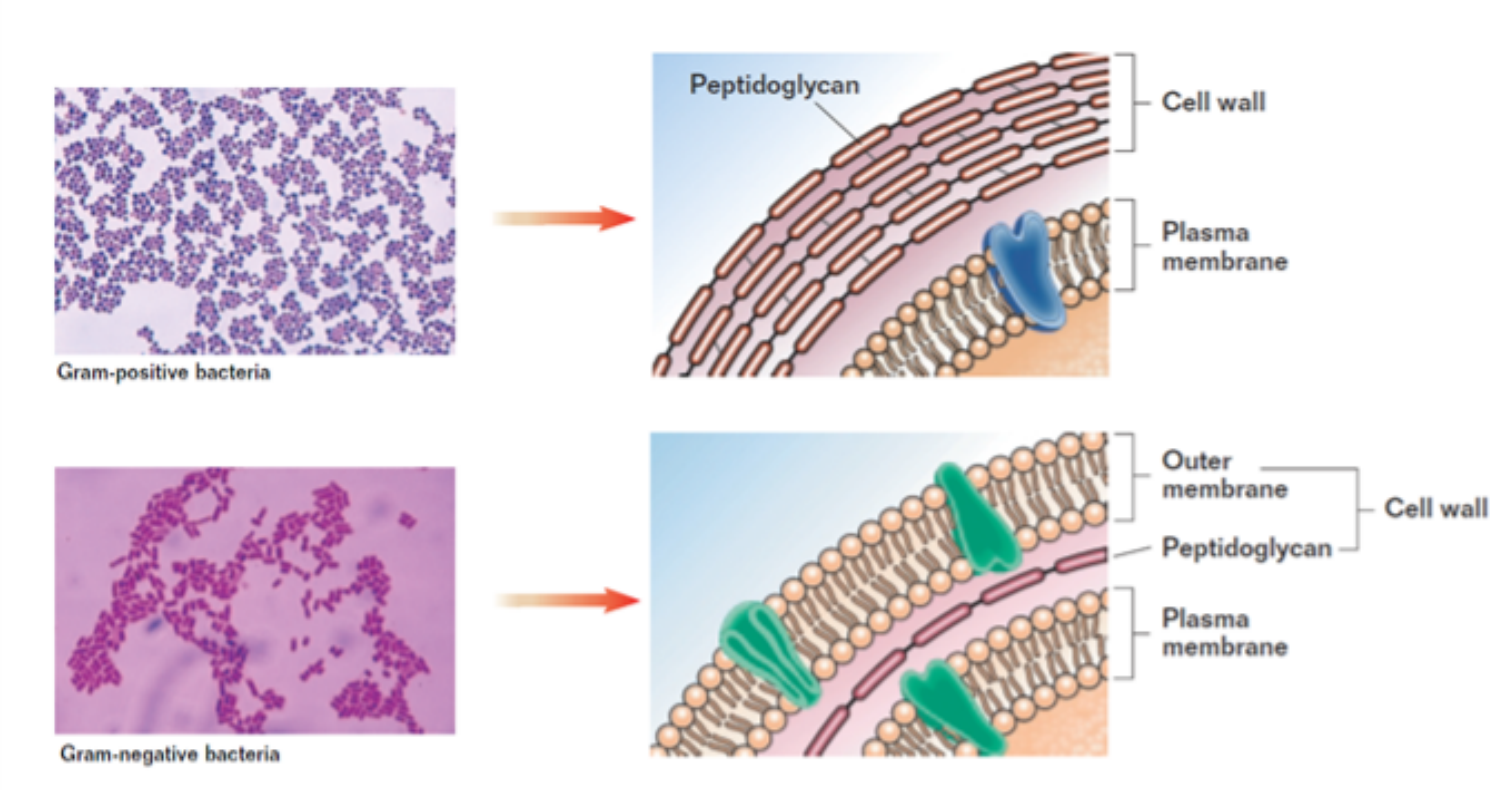
Bacteria have a cell wall that is called a capsule and is a gel-like layer

Cell Walls- There can be two types of cell walls.

These two are distinguished by a process called gram straining.

One group is gram-negative and the other gram-positive.

This is important to know because certain antibiotics work on certain kinds.



**Endospores**-thick walled coverings around their chromosomes and some cytoplasm when exposed to harsh condition. Could be high temps, drought, lack of nutrients. They can be this way for years.

**Pili-** these enable bacteria to adhere to a surface like skin

**Conjugation**- process by which two organisms exchange genetic information. Bacterium can exchange genetic information. Why is this bad?

## Bacteria are group by how they get energy

Photosynthetic bacteria
Chemoautotrophic bacteria
Heterotrophic bacteria

## Photosynthetic bacteria

Purple nonsulfur
Cyanbacteria
Green sulfur
Purple sulfur

Anerobic (oxygen-free) environment

**Chemoautotrophic bacteria**

Obtain energy by removing electrons from inorganic molecules like ammonia and hydrogen sulfide

They have an important role in the nitrogen cycle.

**Heterotrophic bacteria**

Feed on organic material, principal decomposers of the living world, break down dead organisms.

Odor in soil comes from bacteria.

Many need oxygen to live.

**Bacteria can metabolize their hosts.**

They secrete enzymes that break down complex organisms in their environment. This could be a problem if the environment is the human body.

Acne-a bacteria normally grows in the oil gland of the skin. During puberty the body makes more oil. The bacteria plug up the glands, and then there is more oil on the skin.

**Antibiotics-**

1928 Alexander Fleming noticed a fungus growing near a bacteria culture. He saw the bacteria did not grow near the fungus. The fungus was secreting a substance that killed the bacteria and penicillin was discovered.

Food ferment with the assistance of bacteria like: pickles, buttermilk, cheese, sauerkraut, olives, vinegar, and sourdough bread

Botulism- bacteria affects the nervous system like double vision and paralysis.

| Disease | Mode of Transmission | Symptoms |
|---|---|---|
| **Tuberculosis** | Airborne water droplets | Fatigue, persistent cough, bleeding in lungs; can be fatal |
| **Diphtheria** | Airborne water droplets | Fever, sore throat, fatigue |
| **Scarlet fever** | Airborne water droplets | Rash, fever, sore throat |
| **Bubonic plague** | Fleas | Swollen glands, bleeding under skin; often fatal |
| **Typhus** | Lice | Rash, chills, fever; often fatal |
| **Tetanus** | Dirty wounds | Severe, prolonged muscle spasms |
| **Cholera** | Contaminated water | Severe diarrhea, vomiting; often fatal |
| **Typhoid** | Contaminated water and food | Headaches, fever, diarrhea, rash; often fatal |
| **Leprosy** | Personal contact | Nerve damage, skin lesions, tissue degeneration |
| **Lyme disease** | Ticks | Rash, pain, swelling in joints |