Biology
Notes: Kingdom: Archaebacteria, Eubacteria

Prokaryotes:

- Very small (0.5 - 1.5 microns), single-celled organisms - simplest organisms.
- Includes *eubacteria* and *archaebacteria*
- Prokaryotes can be found almost anywhere: water, soil, air and in many objects.

Structure:

- Prokaryotes have NO membrane-bound organelles like: a nucleus, golgi apparatus, endoplasmic reticulum, mitochondria, or chloroplasts.
- Prokaryotes posses enzymes which are attached to the plasma membrane.
- They *usually* have a cell wall which prevents fracturing or during osmosis.
- It is sometimes surrounded by a capsule or a loose slimy layer.
- Ribosomes are the only cytoplasmic organelles - which are much smaller than eukaryotic ribosomes.
- DNA is located in region called the *nucleoid*
- *Plasmids* are "extra rings of DNA".
- In order to transport themselves, prokaryotes use *flagella* - It rotates 360^{o} to propel the cell.

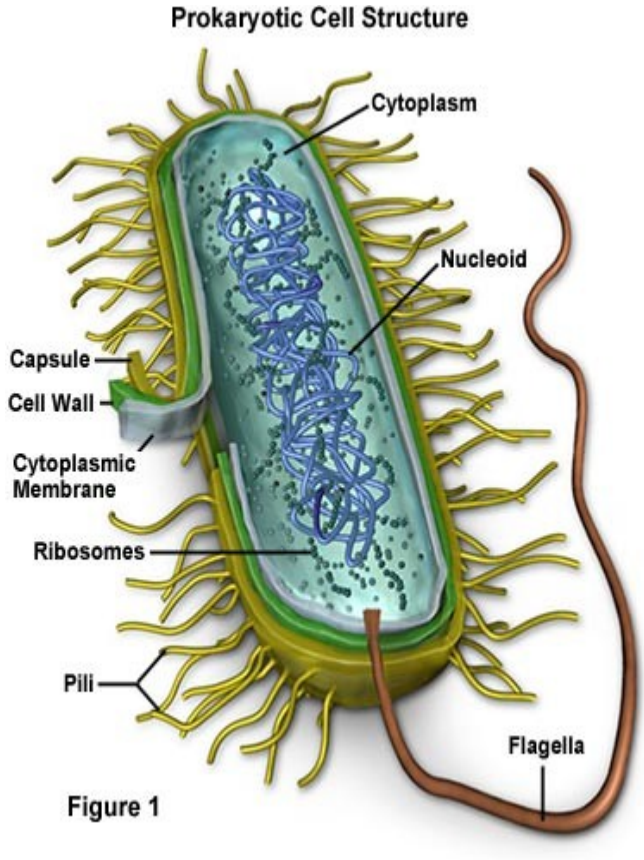
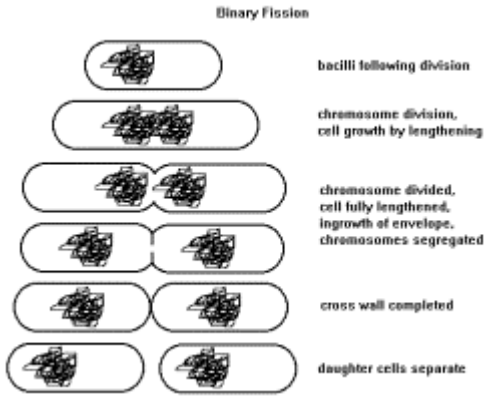


Figure 1

Reproduction:

- *Binary fission* (asexual) is when the cell does not go through the stages of mitosis. DNA *replicates* during cell division. Once replication has taken place, DNA molecules attach themselves to the *plasma membrane.* The chromosomes are pulled apart as the cell gets larger. The plasma membrane begins to grow inward when the cell is about twice it's original length.



- *Conjugation* (sexual) - when bacteria transfers DNA to another bacteria through a structure called a sex pilus.

- *Transformation* - when a bacteria picks up fragments of DNA released by dead bacteria or secreted by live bacteria.
- *Transduction* - when *bacteriophages* (viruses) carry portions of bacterial DNA from one cell to another.

Endospores:

- Bacteria may form endospores when environmental conditions become unfavorable.

  * Example: <u>Baccilus anthrascis</u> (Anthrax)

Oxygen Requirements:

- Obligate anaerobes: are unable to grow in the presence of oxygen.
- Facultative anaerobes: can grow with or without oxygen.
- Aerobic organisms: require oxygen - most bacteria are aerobic.

Feeding:

- *Autotrophs* make their own organic food.

  * *photosynthetic* autotrophs make organic food using energy from the sun.

  * *chemosynthetic* autotrophs make organic food using energy from breaking down compounds such as hydrogen gas, nitrites, sulfides, and ammonia.
- *Heterotrophs* consume food that is already present in the environment.

  Three types of heterotrophs are made by their feeding modes:

  1.) *Saprotrophic* organisms are decomposers.
  2.) *Mutualistic* organisms are those that live in close association with another species and both benefit as a result of the association.
  3.) *Parasites* are organisms that live in close association with another species and one species benefits at the expense of the other.

Shape:

- The shape of a cell is used to classify bacteria also:
  1.) *Cocci* are round cells.
  2.) *Bacilli* are rod-shaped cells.
  3.) *Spirilla* are rigid, spiral-shaped cells.

Major Groups of Archaea:

- There are three major groups of archaea that are found in extreme habitats:

  1.) *Methanogens* are found in places like marches and the intestinal tracts of animals. They produce methane as a result of cellular respiration.
  2.) *Halophiles* are found in places with high salt concentrations like salt lakes or salty soils.
  3.) *Thermoacidophiles* are found in hot, acidic places like hot springs and hydrothermal vents.