Bacteria

Domain: Bacteria and Archaea

Kingdom Eubacteria and Archaebacteria (previously Monera)

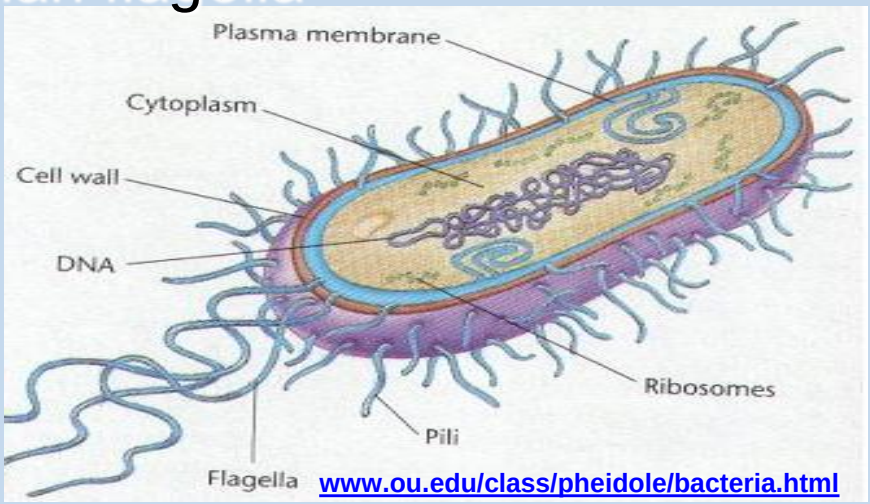
Crash Course: Bacteria Video

Characteristics

- Lack nucleus and organelles (prokaryotic)
- Usually smaller than eukaryotic cells
- Single cells but can form strands or clumps
- Single circular piece of DNA
- Reproduce by binary fission
  - Can divide every 20 minutes
  - Limited food source reduces actual rate of division

Characteristics

- Flagella that spins for movement
  - Some have pili
    - Shorter and thicker than flagella
    - Used for attachment



www.ou.edu/class/pheidole/bacteria.html

- Aerobic or anaerobic metabolism

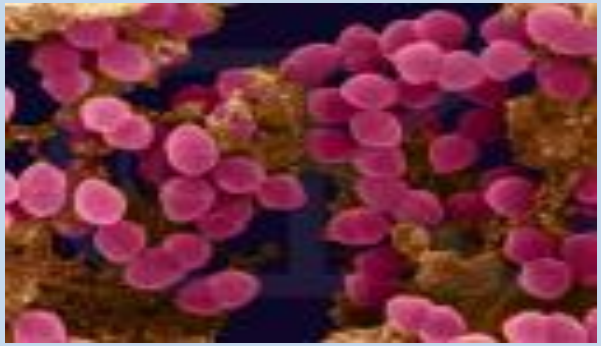
Classification of Bacteria

- Ways Bacteria are classified
  - Shape – most common way to classify
  - Arrangement (Number/ size)
  - Food requirements
  - Oxygen requirements
  - How they move/number of flagella
  - Cell wall composition (gram staining)
  - Method of reproduction – rarely used

Bacterial Shapes

- Bacillus = rod

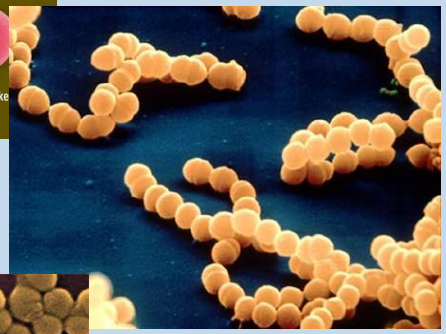
- Coccus = round

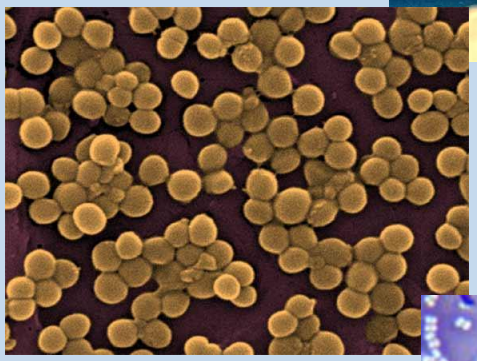


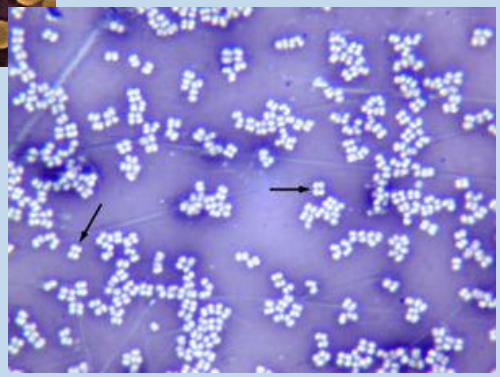
- Spirillum = spiral

Bacterial Arrangement

- Diplococcus = 2 round bacteria cells
- Streptococcus = chains of round bacteria
- Staphylococcus = cluster of round bacteria
- Tetrad = 4 round bacteria in a square



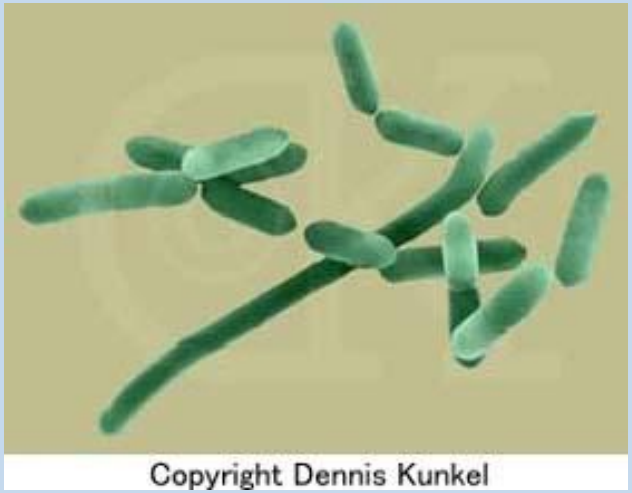




Bacterial Arrangement

- Diplobacillus = pairs of rod shaped bacteria

- Streptobacillus = chains of rod shaped bacteria



Bacteria Facts

- Bacteria is everywhere
- The number of bacteria in the human mouth is greater than the number of people who ever lived on the earth.
- Bacteriologist is a scientist who studies bacteria.
- Bacteria is grown in a lab as a culture with nutrient agar (food source).

Gram Staining

- Used to identify the type of bacteria present
- Used to determine the best antibiotic needed to kill the bacteria
- Antibiotic = interferes with the life processes of bacteria
  - Alexander Fleming – penicillin inventor

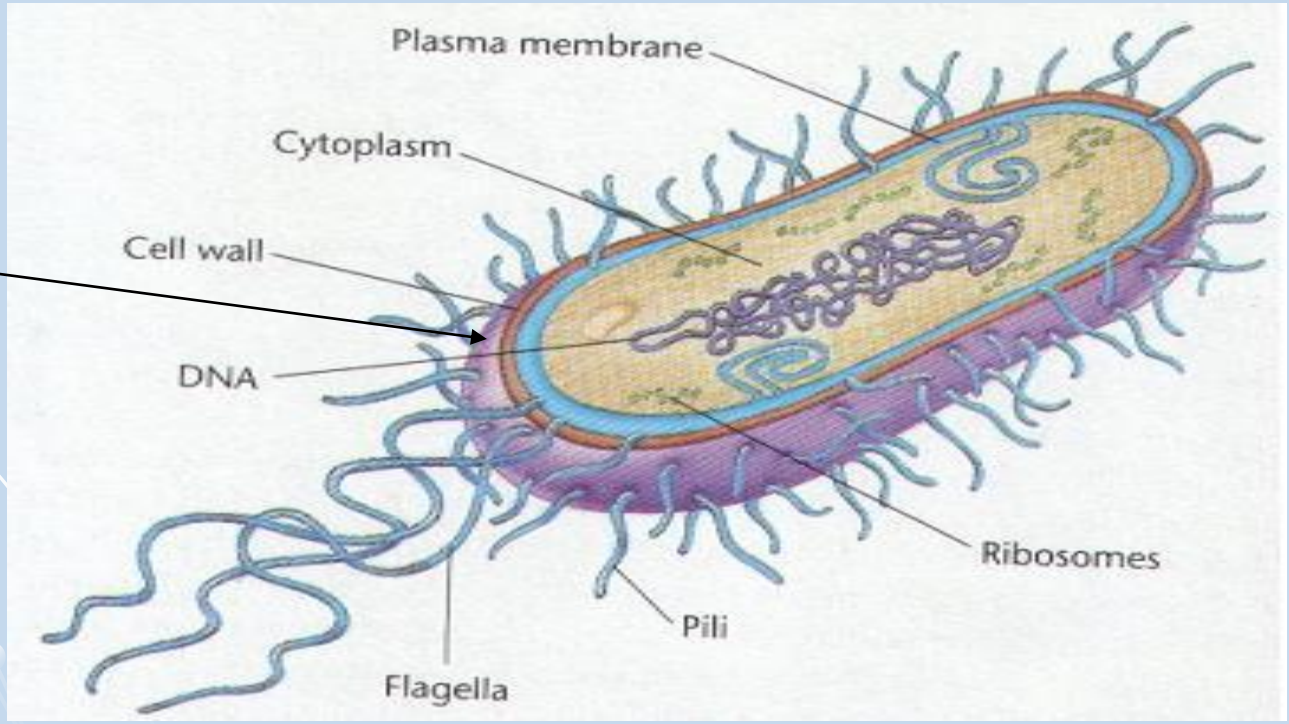
Why are bacteria so resistant?

- Endospores = thick walls around bacteria during harsh conditions
  - Ex- low nutrients, drought, high temperatures, low temperature, etc.
  - Endospores will open up when conditions become more favorable.

Bacteria Structure

- Draw a bacterial cell. Label cytoplasm, DNA, ribosomes, flagella, pili, capsule, cell wall, cell membrane

Capsule = purple outer layer



Obtaining Energy (nutrition)

1. Photosynthetic = makes own food
2. Heterotrophs = obtain food from another source
    a. Saprophytes = Eat dead organisms
    b. Symbiotic relationships = live in close association with another organism
        - Mutualism = both organisms are helped
            - Example= sheep & cows have bacteria in stomach to aid in grass digestion
        - Parasitism = one is helped; other is harmed
            - Host = organism that is harmed

Obtaining energy (nutrition)

3. Chemoautotrophs
   - Use inorganic compounds such as ammonia and hydrogen sulfide to make food
   - Use organic compounds such as methane to make food

Respiration

- Obligate aerobes - require oxygen
- Obligate anaerobes – require no oxygen; oxygen will poison the bacteria and kill it
  - Botulism – produces toxins in improperly canned foods
- Facultative anaerobes – can function with or without oxygen but will not be poisoned by the presence of oxygen

Economic Importance

- Pathogenic – disease causing
  - Examples: tuberculosis, anthrax, bubonic plague, cholera, dental cavities, lyme disease, typhus, strep throat, acne, tetanus, stomach ulcers
- Food Poisoning
  - Botulism
  - E. coli (ground beef)
- Food spoilage

Economic Importance

- Biowarfare
- Food Production
  - Pickles, buttermilk, cheese, sauerkraut, olives, vinegar, sourdough bread, sausage
- Make chemicals
  - Acetone, butane, medicines
- Mining
  - Extracts minerals from impure sources
- Clean up petroleum and chemical spills

Preventing Food Spoilage

- Refrigeration
- Freezing
- Drying
- Salting
- Canning
- Heating thoroughly