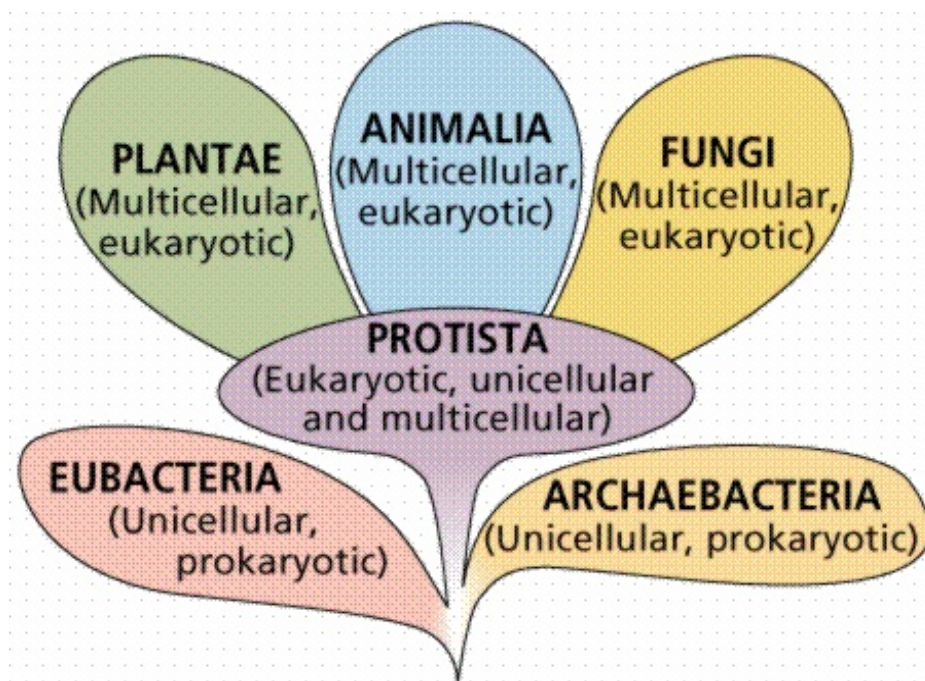


Diversity Among Living Things :
(An overview of the six Kingdoms)
page 133

You are expected to know general characteristics organisms in each Kingdom share with each other, and a very general understanding of the diversity that exists in each Kingdom. You are also expected to be able to identify examples of organisms in each Kingdom, and briefly describe major aspects of their life cycles.

Lets start with a phylogenetic diagram....we will investigate each Kingdom....in the order in which they are believed to have appeared in Earth's history.



Kingdom Bacteria, or Eubacteria, or Monera :

Bacteria can be classified based on their shapes, their cell wall structure, their nutrition, or their preferred habitats.

Shape :

- **cocci**, **bacilli**, or **spirilli** as individuals
- In group formation, we add a prefix to describe the shape..... **diplo-** means pairs, **staphylo-** grape like clusters, and **strepto-** in chains or filaments.

Cell Wall Structure :

- 1884 Hans Gram develops a stain that allows us to see differences in cell wall structure

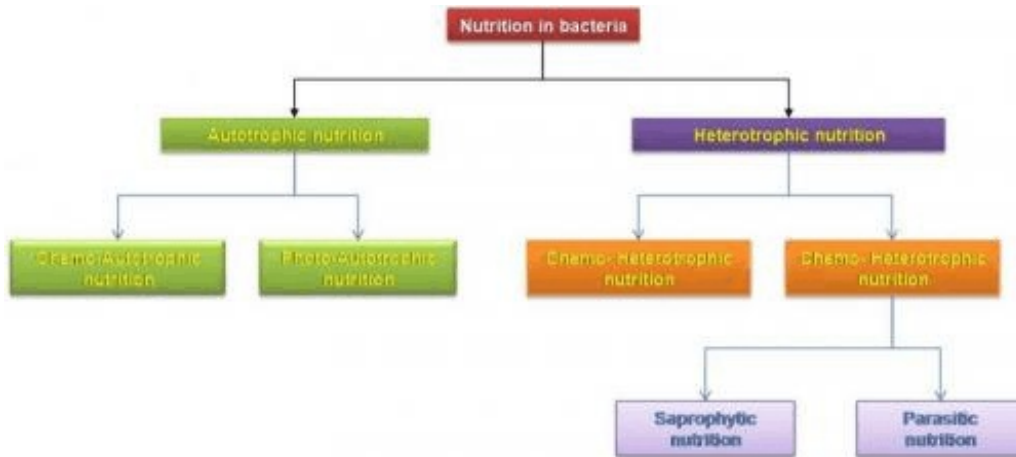
Gram positive bacteria - have a thick cell wall made of peptidoglycan and stain purple
Ex. E. coli

Gram Negative bacteria- have two cell walls, only the inner one is made of peptidoglycan, so they stain a lighter pink
Ex. Anthrax

Nutrition :

- bacteria are found in a wide variety of environments because they can use such a wide variety of food sources

<http://www.tutorvista.com/biology/nutrition-of-bacteria>



For some other terms used to classify bacteria based on their use of energy, see “wordlink”, page 134.

Bacterial Reproduction : Asexual AND Sexual

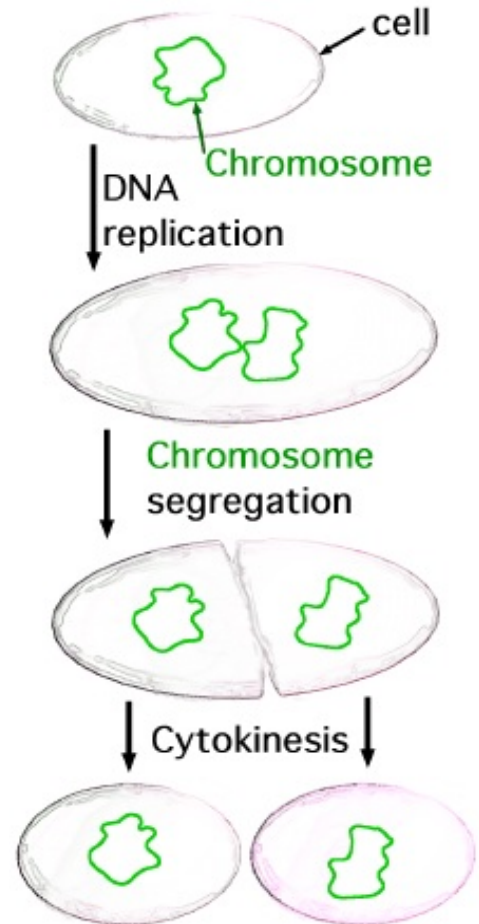
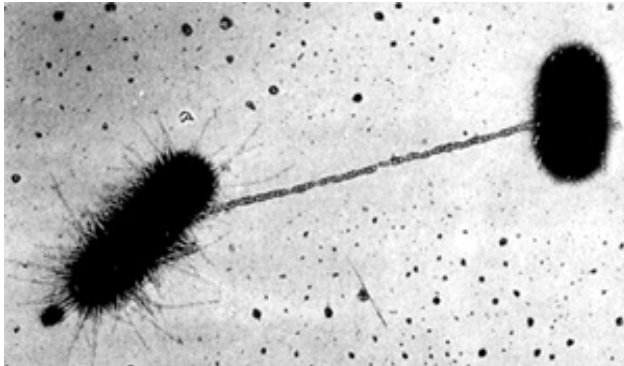
- issue for food spoilage, bacterial infections, composting, sewage treatment, and fermentation
- their genetic material isn't inside a nucleus, so their form of asexual reproduction is actually simpler than "mitosis".....they use "**Binary fission**", can reproduce exponentially every 20 mins.

One large single chromosome, plus **plasmids**- smaller loops of genetic material separate and might later recombine with this large single chromosome

OR

Sexually - **conjugation** :

build bridge like structures (**pili**) between each other, through which genetic material is exchanged



Useful for recombinant DNA technology ! (ask)

In dormant bacteria (unfavourable environments), a tough coat might form around its DNA (makes an "**endospore**")...heat/cold resistant, chemically resistant, drought. Copies itself when environment becomes favourable. Can be denatured with extreme heat.

Kingdom Archea (the Archeans) :

Prokaryotic cell species found living in Earth's most extreme environments (extremely hot, salty, pressurized environments like volcanoes, rock strata, Dead Sea, deep sea vents). Look similar to other bacteria, but biochemistry and genetics are quite different.

- have a cell wall like bacteria, but theirs is mostly fat based.....the type of fat varies with the species and environment.
- some move with flagella (like some bacteria), also reproduce similarly (binary fission or conjugation)
- three categories.....

Methanogens : live in anaerobic environments, using CO₂, N₂, or HS to make energy. Release methane gas as waste.

Halophiles : extremely salty environments, use photosynthesis and are aerobic.

Thermoacidophiles : hot, or acidic environments. Use chemosynthesis and are anaerobic.

Kingdom Protista (the Protists) :

Huge Kingdom, lots of species diversity. Eukaryotic. Some are autotrophs, others heterotrophs. Some have cell walls, others don't. Some are **motile**, others aren't. Most are unicellular, some are not. Most are aerobic, some aren't.

Three big subgroups :

1. **Protozoans** - heterotrophs. No cell wall. Vary in size. May be parasites. Classified based on how they move.

Ex. **Flagellates** - live in gut of plant / wood eating species

Sarcodines - hunt prey using phagocytosis.

Ex. Amoebae

Ex. Foraminifera

Ciliates - covered by cilia that "beat" to move the organism
Some are free living (ex. Paramecium), others symbiotic, others parasitic

Sporozoans - parasites. Ex. Plasmodium.....malaria. Reproduce using spores.

2. **Algae** - Aquatic. Chlorophyll containing. Some free living, others colonial. Classified into 6 groups depending on the type of chloroplasts and pigments they contain. (page 148)

Green Algae -	freshwater
Brown Algae -	cool / cold saltwater (seaweeds)
Red Algae -	warm salt water
Diatoms -	most common unicellulars. Biggest type of plankton, salt and fresh water. Rigid cell walls made of silica. (check out 149 !)
Dinoflagellates -	saltwater, photosynthetic, unicellular
Euglenoids -	freshwater flagellated

3. **Slime Molds** - share similarities with protozoans (move, ingest food), plants (cell walls made of cellulose), and fungi (make spores), but yet are not exactly like the others.

Water moulds - decomposers, some parasitic

Plasmodial slime molds - look like a slow moving slug or blob

Cellular slime molds - individual cells

Kingdom Fungi :

- heterotrophs, releasing digestive enzymes to break down material outside themselves, then absorb the nutrition through active and passive transport into their cells.
“Haustoria” - parasitic structures
- some are unicellular, most are multicellular
- Made up of fine filaments (hyphae) networked together, and cytoplasm can stream from cell to cell through porous septae.
- have cell walls, made of chitin, the same material found in insect exoskeletons and seashells
- some live symbiotically with tree roots, helping move soil nutrients into root cells via hyphae
- reproduce asexually (fragmentation or spores) or sexually (spores)

Include : zygosporangium fungi - ex. Bread mould (Rhizopus), sexually produced spores, rhizoids, sporangium bearing asexual spores as well

Club fungi - mushrooms, bracket fungi, puffballs....special basidia structures contain their spores

Sac fungi - decomposers of wood and bone, plant parasites
bear asci sacs full of spores
Ex. Mildews, morels, truffles

“Imperfect fungi” - can only reproduce asexually, ex. Penicillin, cyclosporin
Soy sauce production, blue cheese