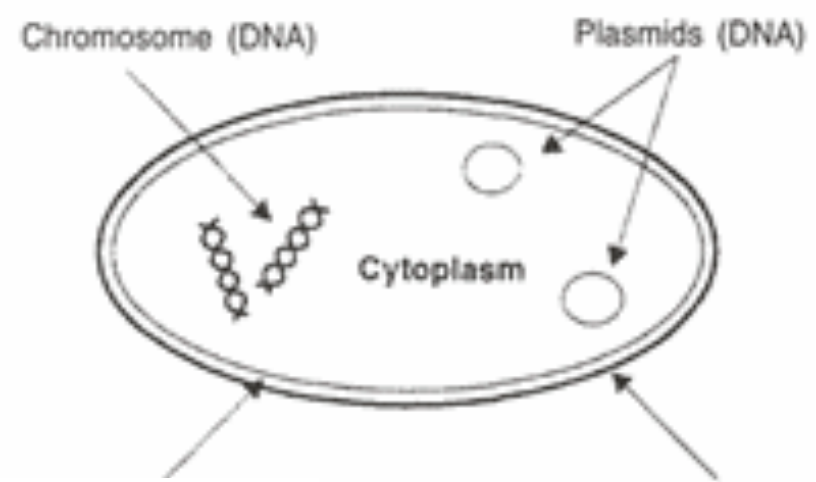
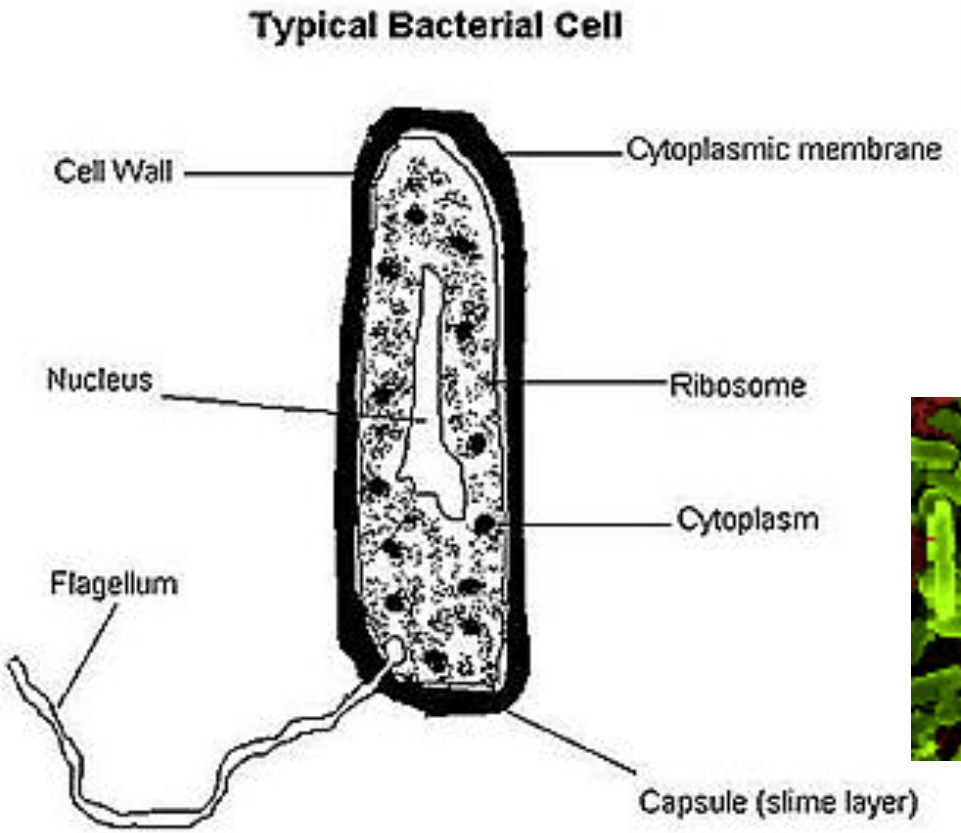
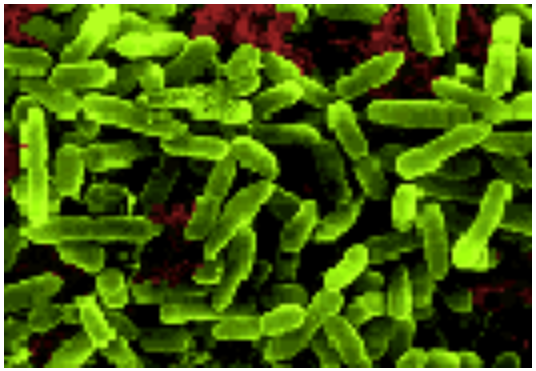
Viruses & Bacteria

Bacteria Cell

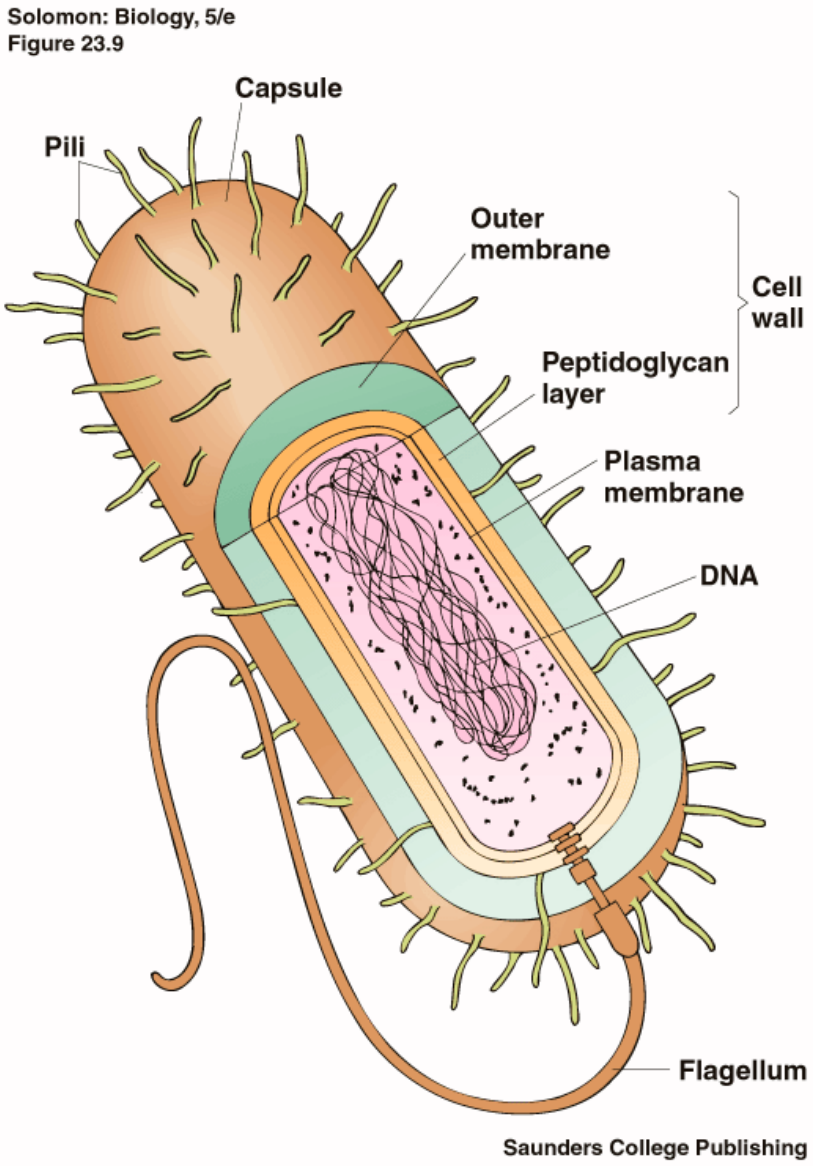






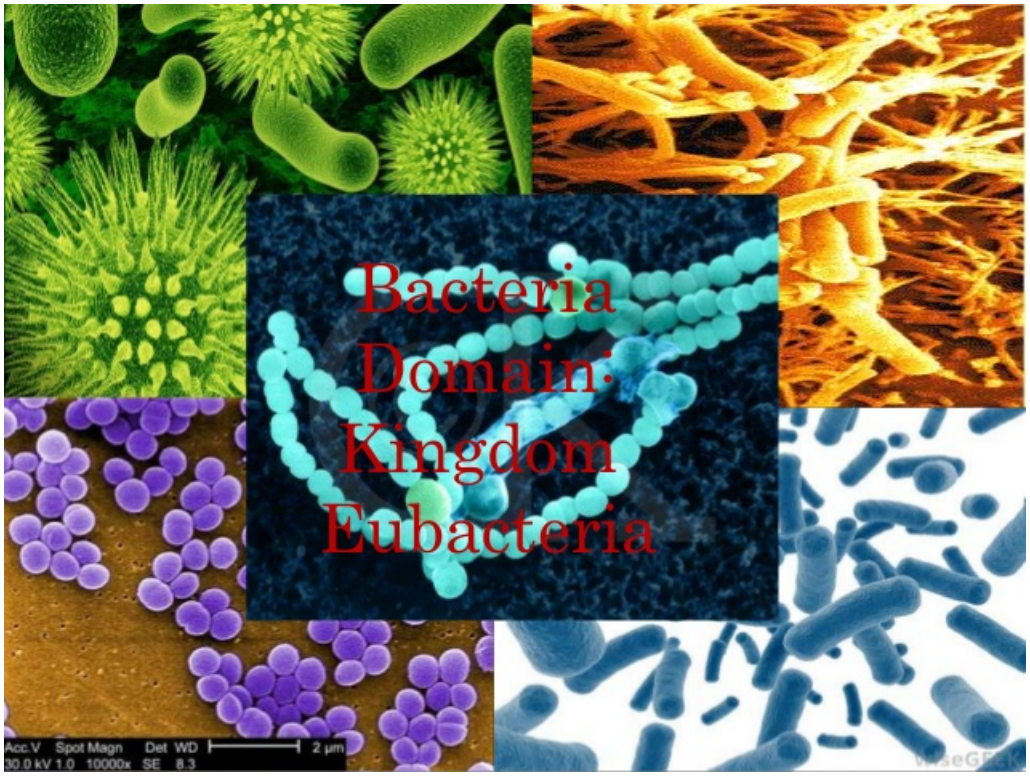
Prokaryotes

- Cells that do not have a nucleus
- Exist almost every where on earth
- Grow in numbers so great you can see them with the unaided eye
- Are placed in either the Eubacteria or the Archebacteria Kingdoms

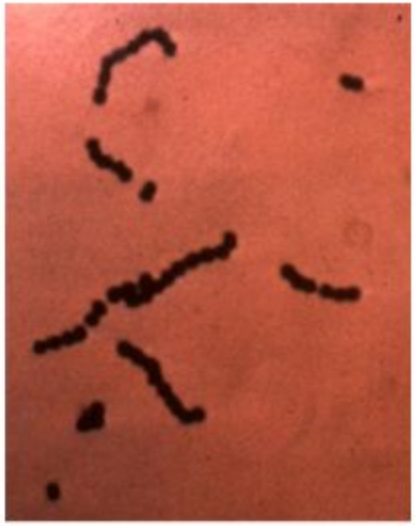


Eubacteria

- Make up the larger of the two prokaryote kingdoms
- Generally are surrounded by a cell wall composed of complex carbohydrates



Examples of Eubacteria



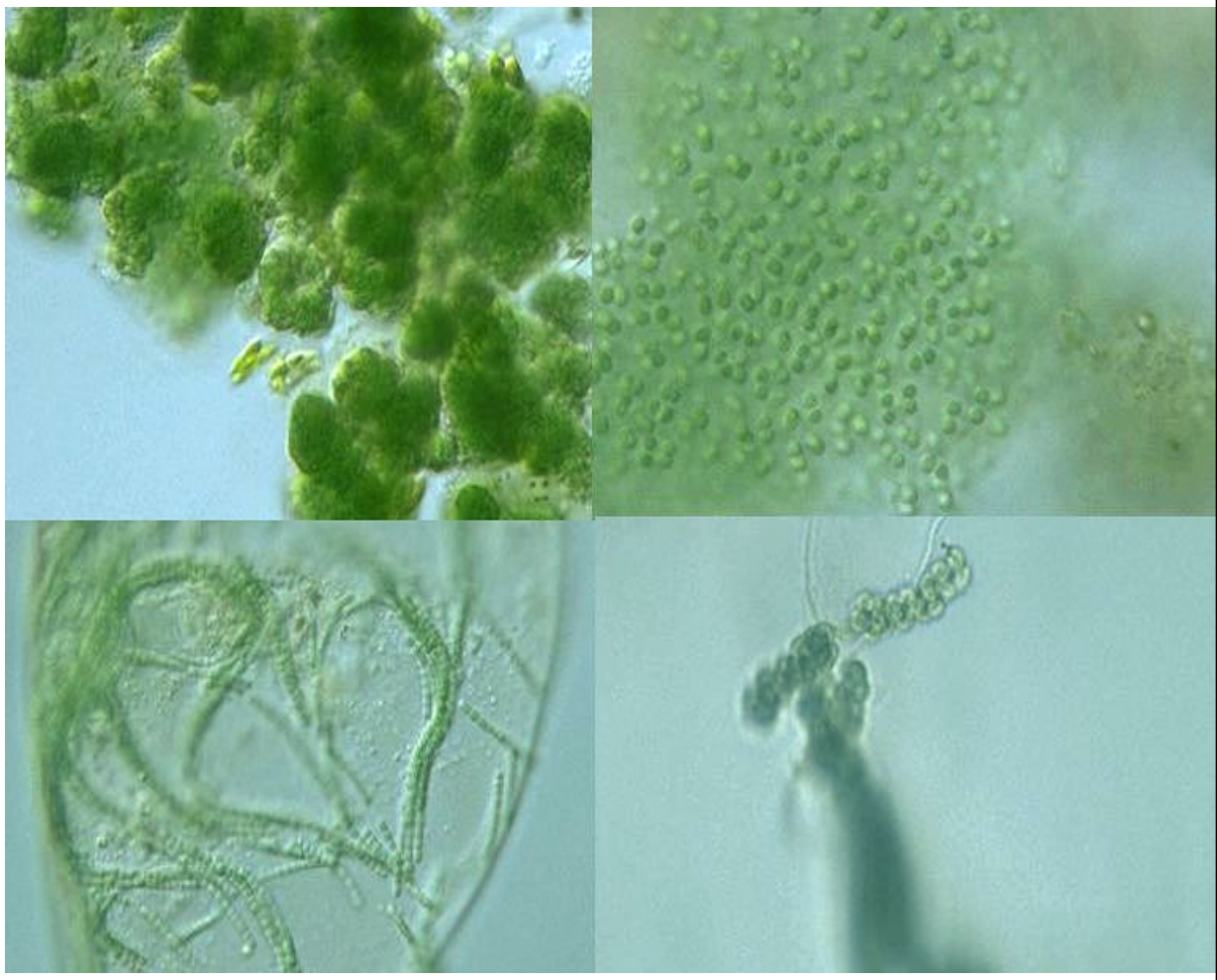
streptococcus
(causes strep throat)

E. coli on lettuce
(helps digest food, can cause food poisoning)

Lactobacillus bulgarus
(1 type of bacteria in yogurt)

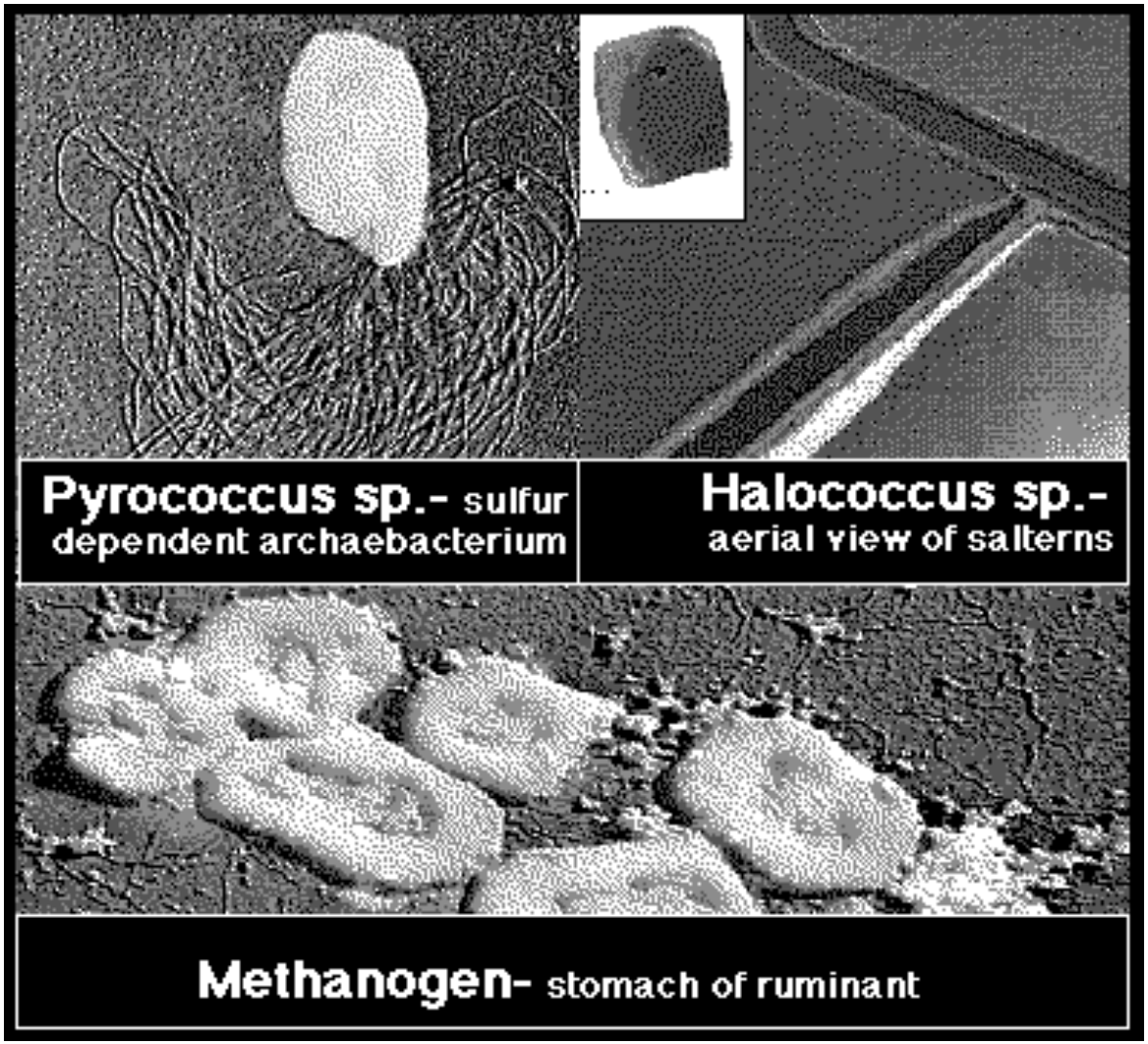
Cyanobacteria

- Photosynthetic bacterium
- Bluish-greenish color
- Contain membranes that carry out the process of photosynthesis
- Do not contain the same type of chloroplasts as plants do
- This bluish-greenish algae can be found nearly everywhere on earth.
- Can survive in extremely hot environments and even extremely cold environment



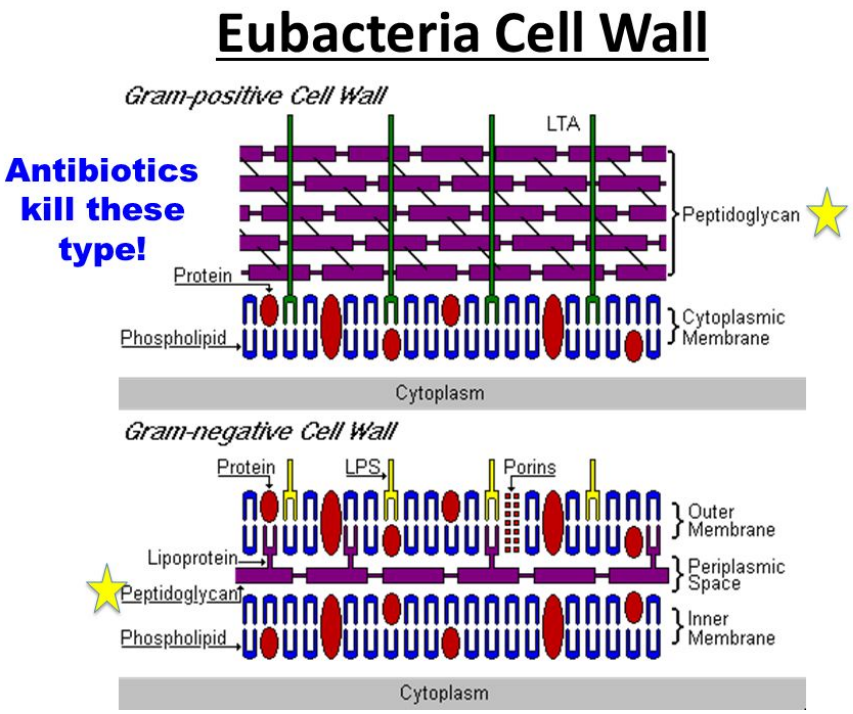
Archaebacteria

- Lack important carbohydrate found in cell walls
- Have different lipids in their cell membrane
- Different types of ribosomes
- Very different gene sequences
- Archaebacteria can live in extremely harsh environments
- They do not require oxygen and can live in extremely salty environments as well as extremely hot environments.



Identifying Prokaryotes

- Cell Shape
- Cell Wall
- Movement

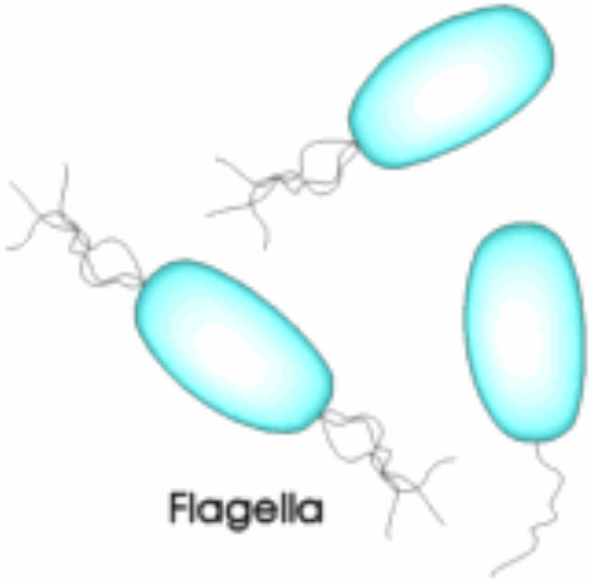


Bacterium Shapes

- Cocci~ Sphere shaped bacteria
- Bacillus~ Rod shaped bacteria
- Spirrillium ~ Spiral shaped bacteria
- Vibrions~ have the comma shape

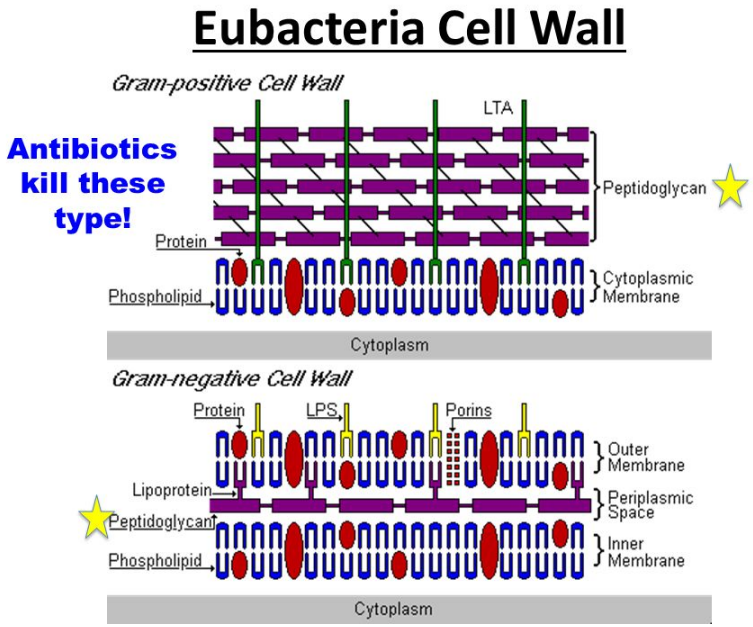
Bacteria can have Flagella~

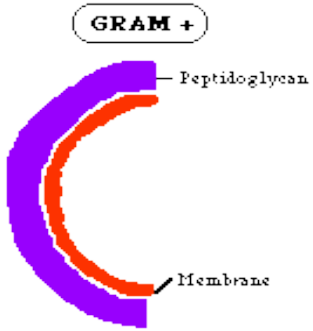
Leg-like structures that help to propel the bacterium.

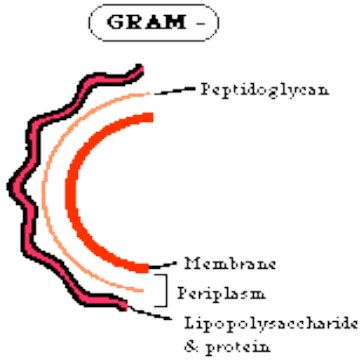


Cellular Walls

- Chemical nature of a cell wall can be determined by Gram Staining
- By finding out what color the cell produces when it is gram stained you can figure out the type of carbohydrates in the cell wall

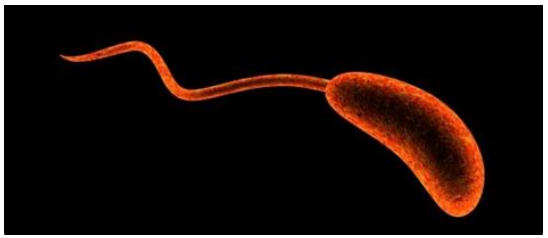


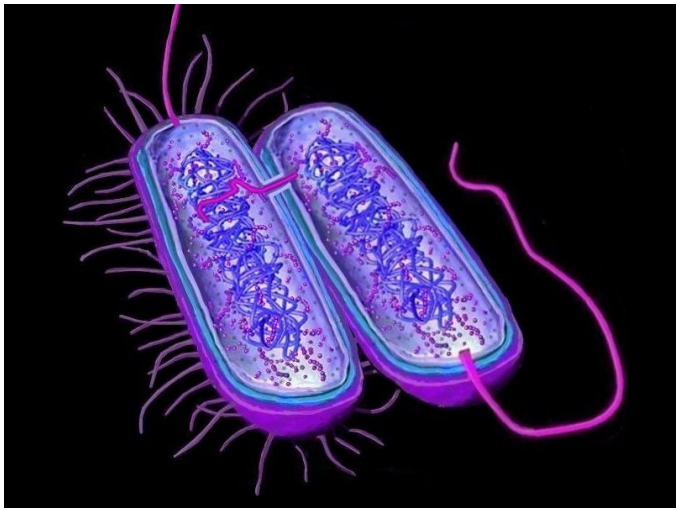




Movement

- Flagella ~ Tail like structure the whips around to propel the bacterium
- Cillia ~ Miniature flagella surround the cell that help to “swim”
- Non motile ~ Sticky cillia like structures that keep the bacterium from moving





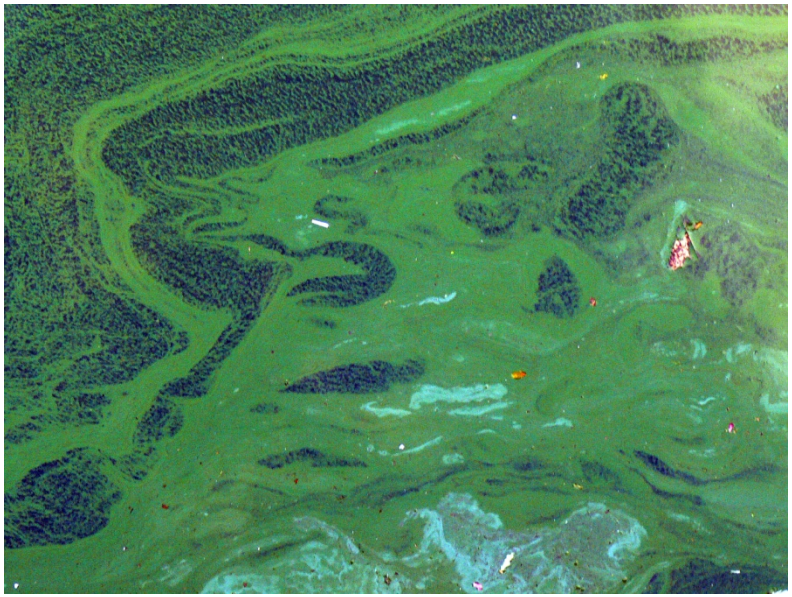
Bacteria and their energy

- Autotrophs
- Chemotrophs
- Heterotrophs

Autotrophs

- Make their own energy

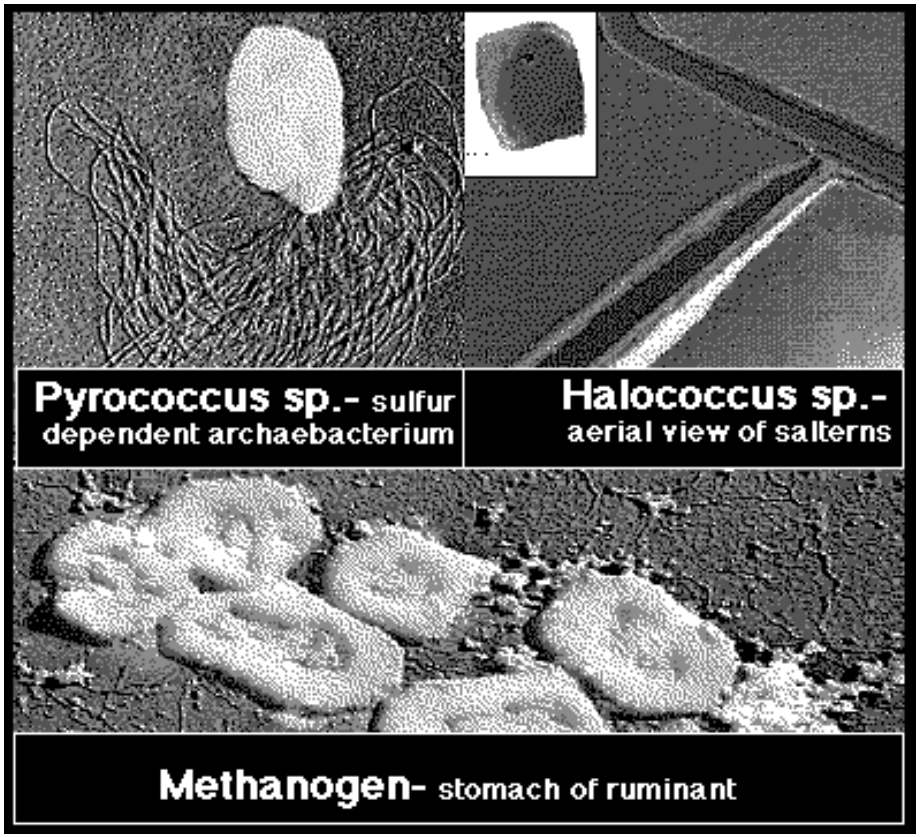
  Using Solar energy
- Es. Cyanobacteria



Chemotrophs

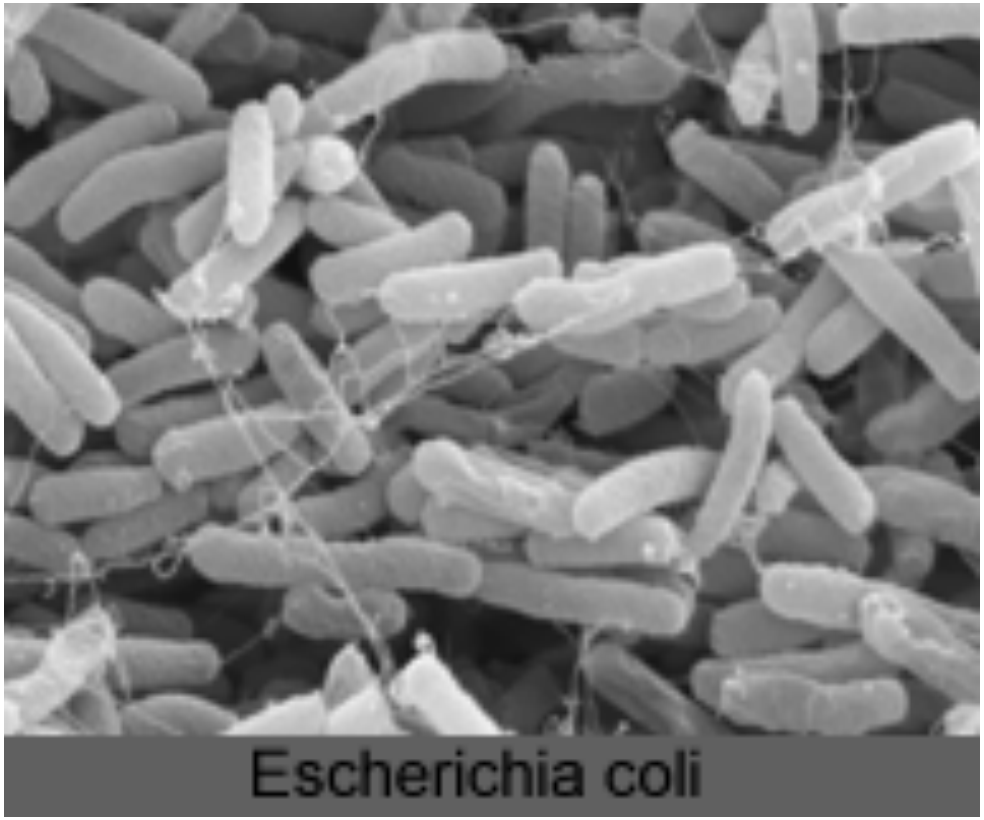
- Make own Energy

  Using Chemical energy
- Es. Archaebacteria



Heterotrophs

- Obtain food by eating
- Es. E-coli



Bacteria Respiration

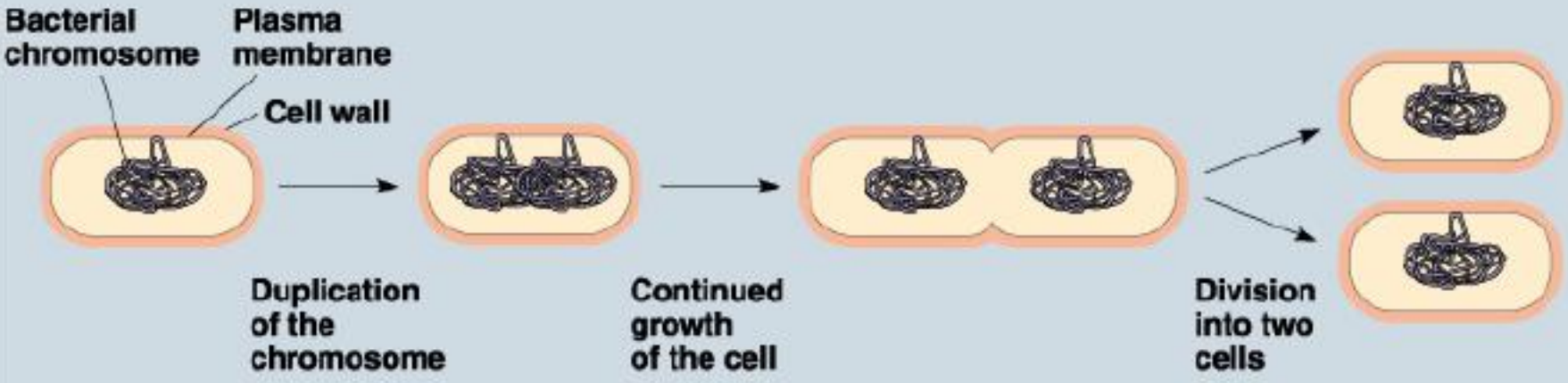
- Obligate Anaerobes
- Facultative Anaerobes
- Obligate Aerobes

- Live without Oxygen
- Can live with or without oxygen
- Cannot live without oxygen.

Bacteria Reproduction

- Binary Fission
- Conjugation
- Trasduction
- Trasformation
- Spore Formation

Binary Fission in Bacteria



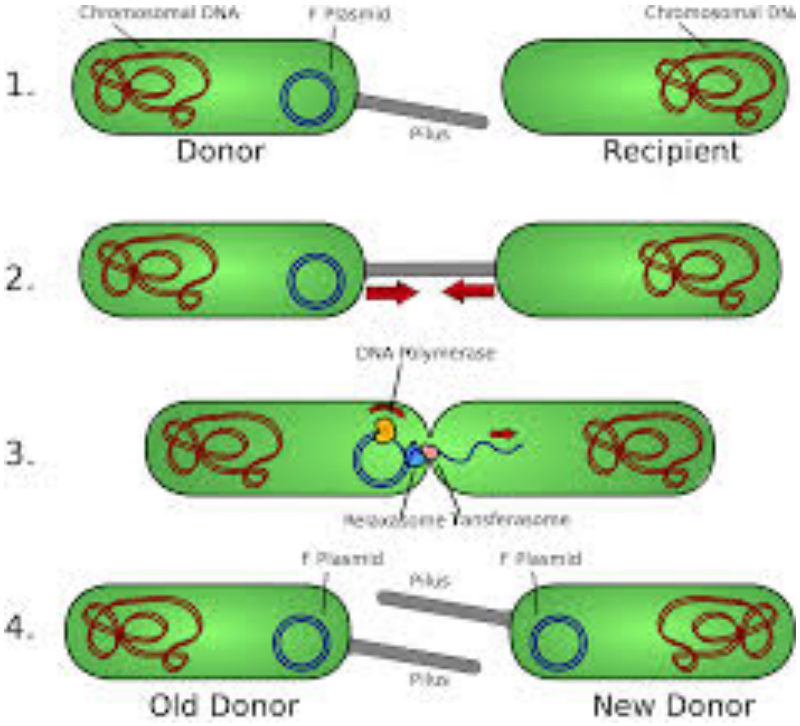
Cellular organism copies it's genetic information then splits into two identical daughter cells

Conjugation

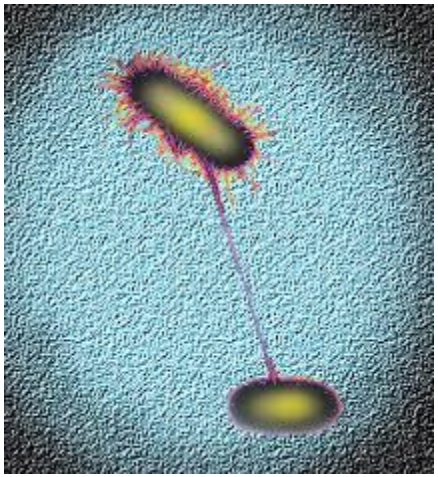
- **Bacterial conjugation** is the transfer of genetic material (plasmid) between bacterial cells by direct cell-to-cell contact or by a bridge-like connection between two cells, conjugation is a mechanism of horizontal gene transfer as are transformation and transduction although

  these two other mechanisms

  do not involve cell-to-cell contact.



Bacterial conjugation is often regarded as the bacterial equivalent of sexual reproduction or mating since it involves the exchange of genetic material.
During conjugation the *donor* cell provides a conjugative or mobilizable genetic element that is most often a plasmid.
The genetic information transferred is often beneficial to the recipient. Benefits may include antibiotic resistance or the ability to use new metabolites.



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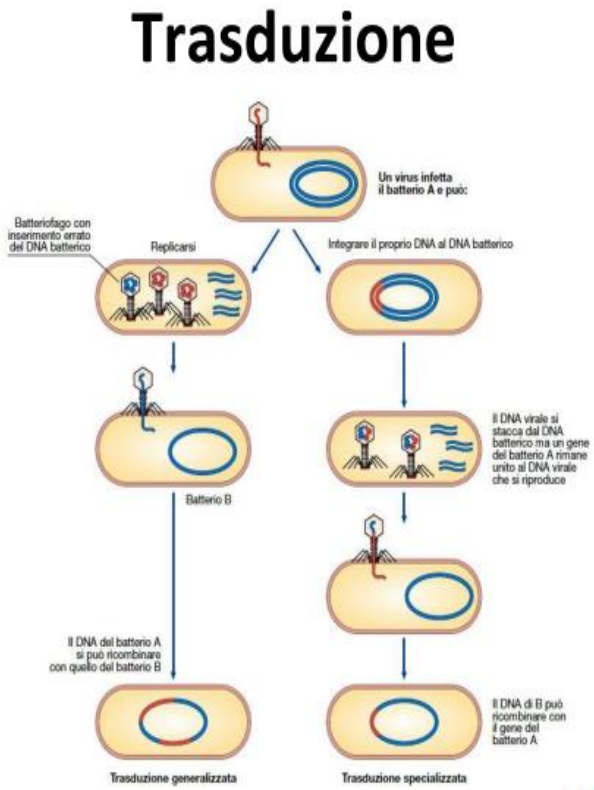
Transduction as a method for transferring genetic material

Transduction is the process by which DNA is transferred from one bacterium to another by a virus. It also refers to the process whereby foreign DNA is introduced into another cell via a viral vector. Transduction does not require physical contact between the cell donating the DNA and the cell receiving the DNA (which occurs in conjugation), and it is DNase resistant. Transduction is a common tool used by molecular biologists to stably introduce a foreign gene into a host cell's genome.



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Transduction happens through either the lytic cycle or the lysogenic cycle. If the lysogenic cycle is adopted, the phage chromosome is integrated (by covalent bonds) into the bacterial chromosome, where it can remain dormant for thousands of generations. If the lysogen is induced (by UV light for example), the phage genome is excised from the bacterial chromosome and initiates the lytic cycle, which culminates in lysis of the cell and the release of phage particles.

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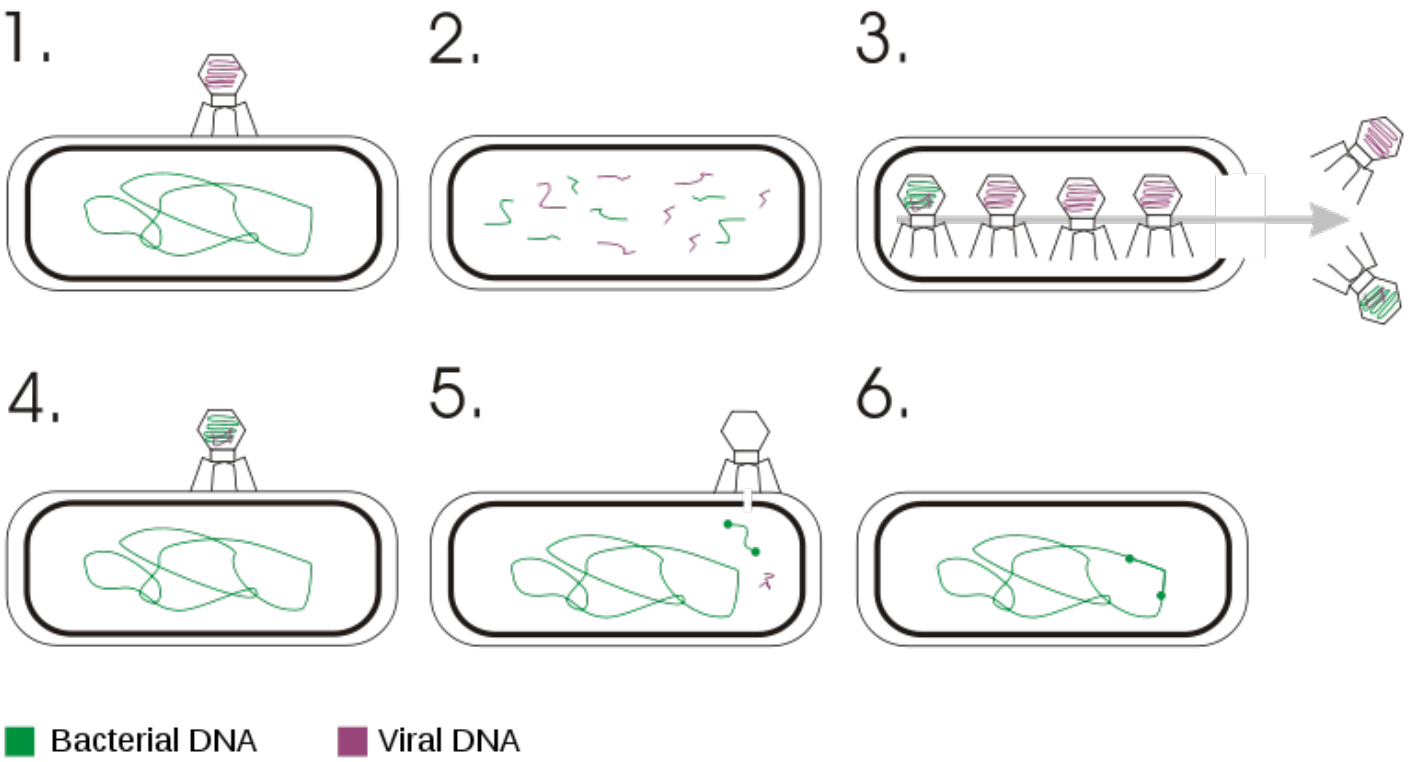
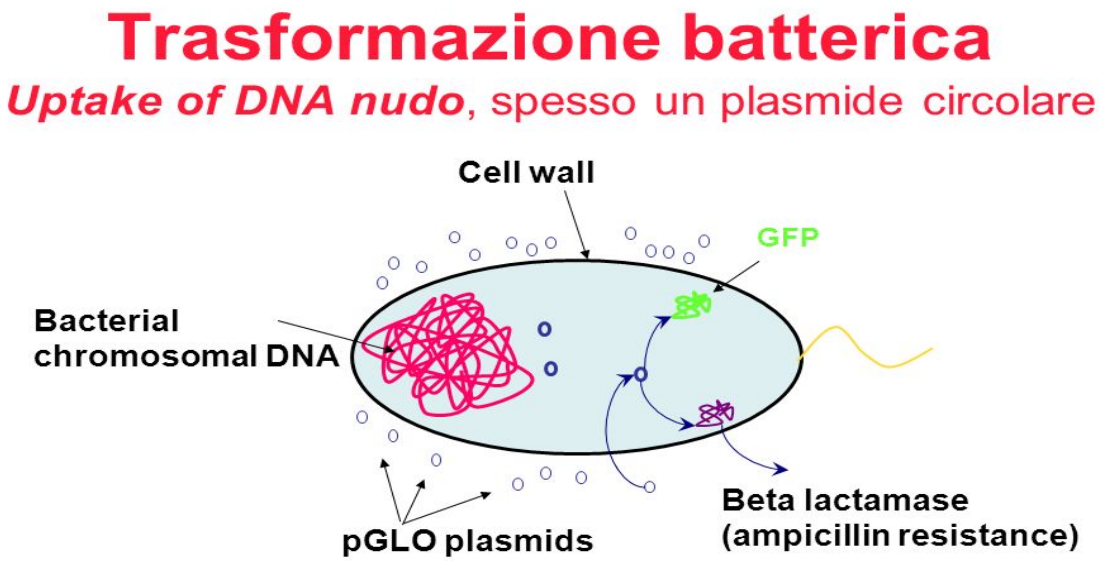


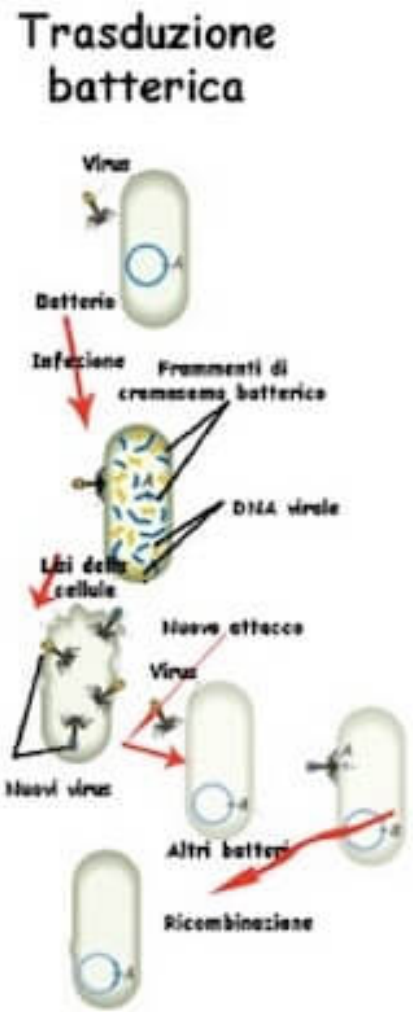
Transformation

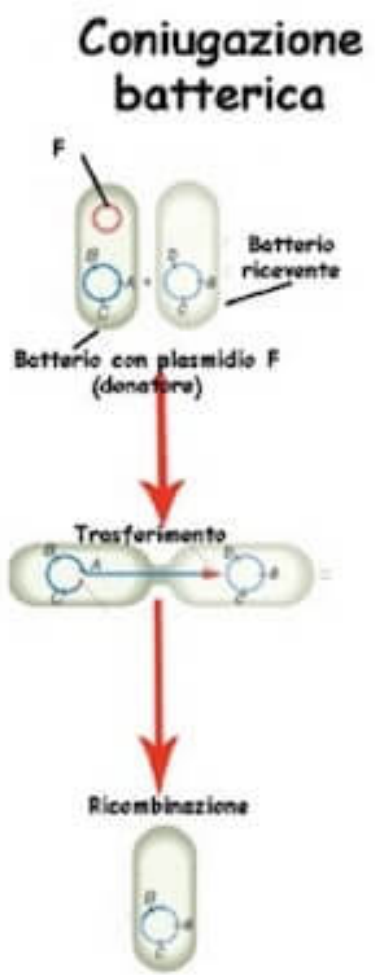
In molecular biology, **transformation** is the genetic alteration of a cell, resulting from the direct uptake and incorporation of exogenous genetic material (exogenous DNA) from its surroundings and taken up through the cell membrane. Transformation occurs naturally in some species of bacteria, but it can also be effected by artificial means in other cells.

https://www.bing.com/videos/search?q=bacterial+transformation&&view=detail&mid=3738FB5F23C225596F483738FB5F23C225596F48&&FORM=VRDGAR

For transformation to happen, bacteria must be in a state of competence, which might occur as a time-limited response to environmental conditions such as starvation and cell density.
Transformation is one of three processes by which exogenous genetic material may be introduced into a bacterial cell, the other two being conjugation (transfer of genetic material between two bacterial cells in direct contact) and transduction (injection of foreign DNA by a bacteriophage virus into the host bacterium).







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Spore forming bacteria are tougher than the average microscopic unicellular organism. These species, which include the genera *Bacillus*, *Clostridium* and *Sporolactobacillus*, can surround themselves with durable coats of protein that allow them to survive in hostile environmental conditions. As spores, bacteria can remain dormant for years, protected from stresses such as chemicals, heat, radiation and dehydration. When revived, however, these bacteria can cause a number of diseases, including botulism, anthrax, tetanus and acute food poisoning.

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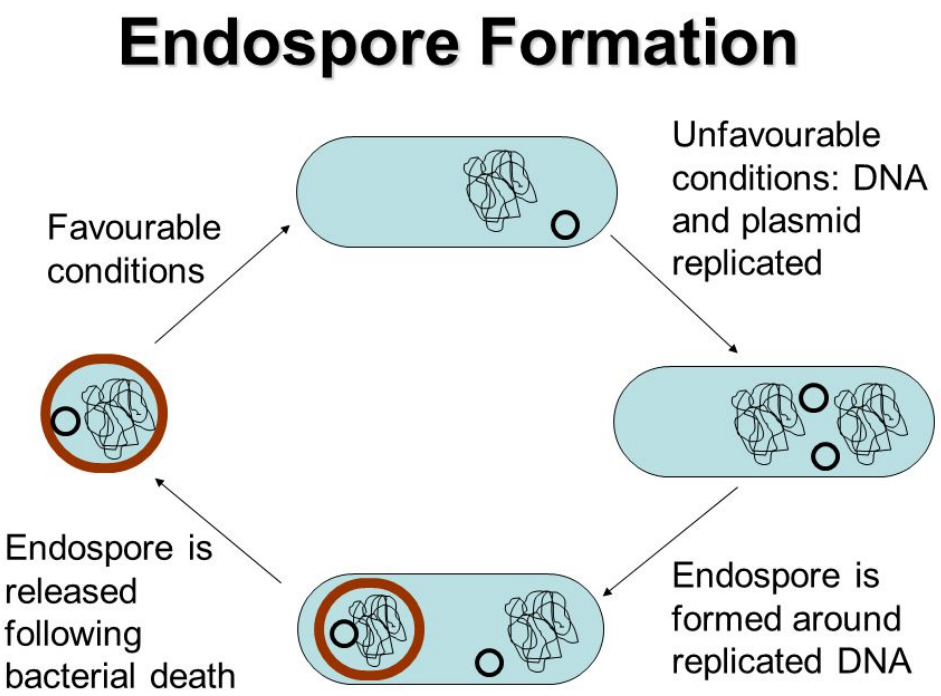
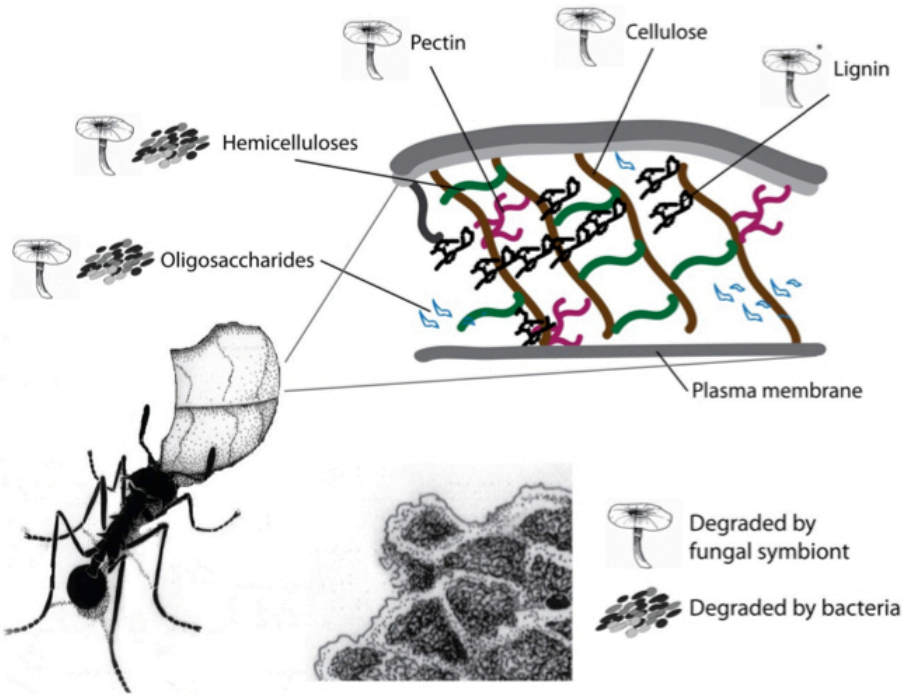


Symbiosis

- Close relationship between to species in which at least one species benefits from the other
- For example, Zoamastogopera, found in the stomach of termites, enable them to digest cellulose
- Live together for LIFE



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The human body carries about 100 trillion microorganisms in its intestines, a number ten times greater than the total number of human cells in the body. The metabolic activities performed by these bacteria resemble those of an organ, leading some to liken gut bacteria to a "forgotten" organ. It is estimated that these gut flora have around a hundred times as many genes in aggregate as there are in the human genome.

Gut flora or, more appropriately, gut microbiota, consists of a complex of microorganism species that live in the digestive tracts of animals and is the largest reservoir of microorganisms symbiotic to humans. In this context *gut* is synonymous with *intestinal*, and *flora* with *microbiota* and *microflora*. Gut microorganisms benefit the host by gleaning the energy from the fermentation of undigested carbohydrates and the subsequent absorption of short-chain fatty acids. Intestinal bacteria also play a role in synthesizing vitamin B and vitamin K as well as metabolising bile acids and sterols

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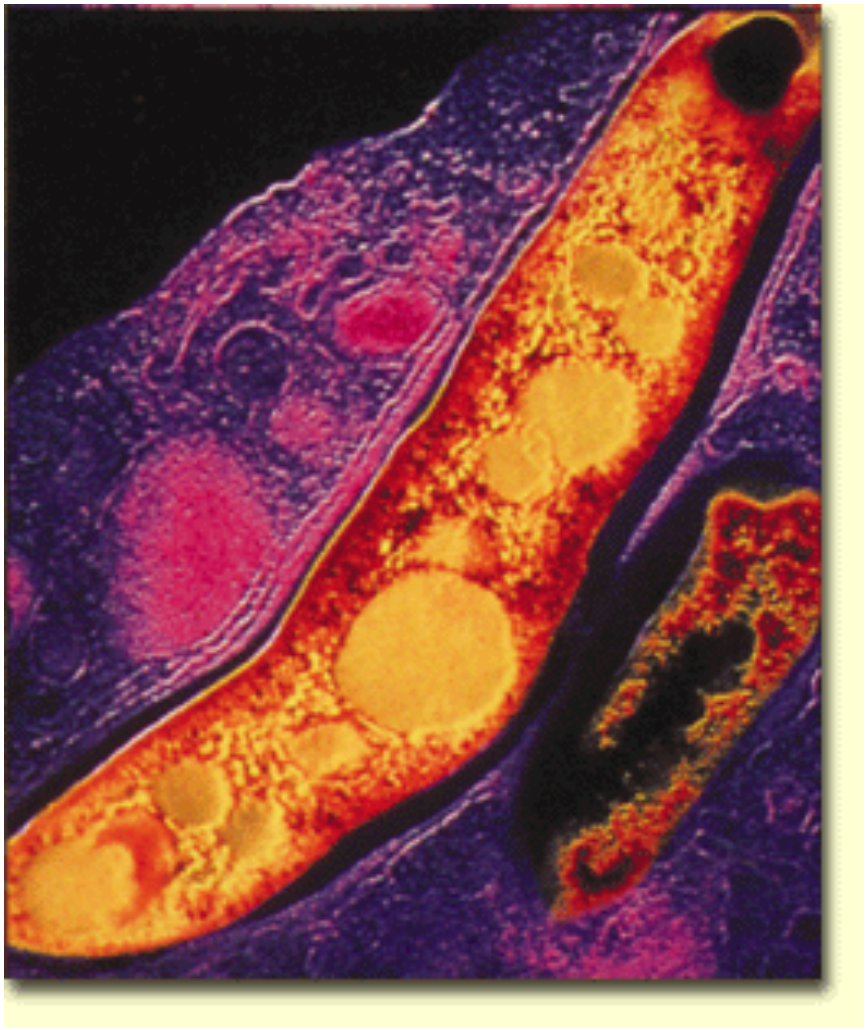
Parasitism

- Bacteria exploit the host cell, injuring them
- Eg. Mychobacterium tuberculosis



Pathogenic bacteria are bacteria that cause bacterial infection

Although most bacteria are harmless or often beneficial, several are pathogenic. One of the bacterial diseases with the highest disease burden is tuberculosis, caused by the bacterium *Mycobacterium tuberculosis*, which kills about 2 million people a year, mostly in sub-Saharan Africa. Pathogenic bacteria contribute to other globally important diseases, such as pneumonia, which can be caused by bacteria such as *Streptococcus* and *Pseudomonas*, and foodborne illnesses, which can be caused by bacteria such as *Campylobacter*, and *Salmonella*. Pathogenic bacteria also cause infections such as tetanus, typhoid fever, diphtheria and syphilis.