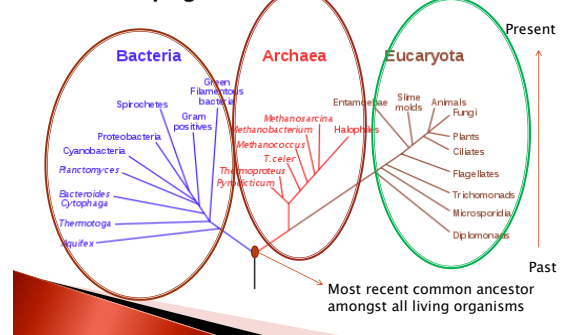
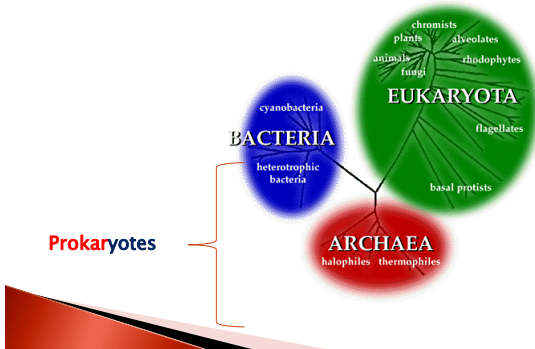


# Domains of Life: Prokaryotes

## New: Phylogenetic Domains of Life



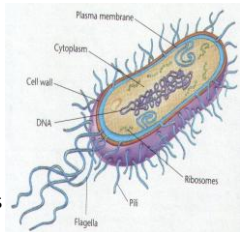
# Domains of Life



- ▶ Domain Eubacteria contains only the Kingdom Eubacteria. > 10,000 described  
Eubacteria = "true" bacteria

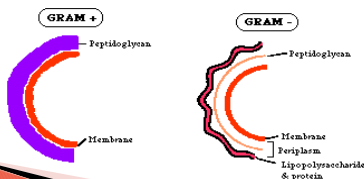
### Characteristics of Eubacteria:

1. Unicellular (single cell)
2. Prokaryotes (no nucleus)
3. Lack membrane bound organelles
4. Peptidoglycan cell wall
5. Plasmid: a small loop of DNA that contain a small number of genes
6. Cilia or flagellated tail

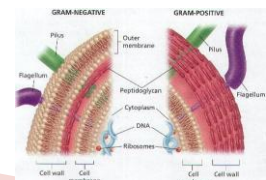
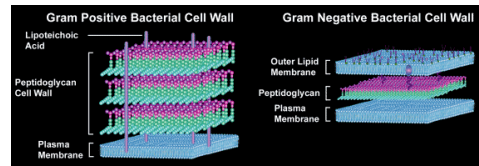


## Bacterial Cellular Walls

- ▶ 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



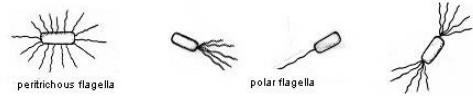
## Bacterial Cell Membrane



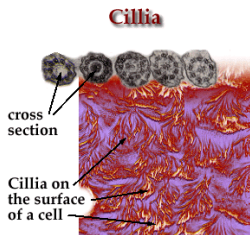
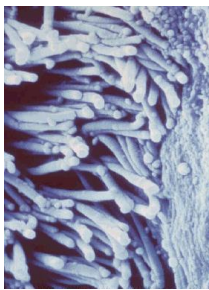
## Movement

- ▶ Flagella ~ Tail like structure that 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

## Flagella



c  
i  
l  
l  
i  
a



## Groups of Bacteria



1. **Proteobacteria (purple bacteria):** use photosynthesis, but a different form from plants. Responsible for many diseases: bubonic plague, dysentery.



## Groups of Bacteria

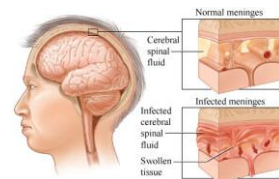
2. **Cyanobacteria:** also known as blue-green algae (but is not algae), use photosynthesis that is similar to plants

- Play an important role in nitrogen fixation for plants
- Form a symbiotic relationship with fungi called **lichen**



## Groups of Bacteria

3. **Gram Positive Bacteria:** cause many diseases, such as strep throat, meningitis or can be used in food production (*Lactobacillus* is used in yogurt products)



## Groups of Bacteria

4. **Chlamydias**: all are parasite that live within other cells. Can cause chlamydia (STD) and trachoma (blindness)



*Chlamydamonas sp.*



*Trichomonas sp.*

## Arrangement of Bacteria

▶ Bacteria also vary in arrangement

Pairs: *Diplo* clumps: *staphylo* strings: *strepto*



Scientists use the shape and the arrangement to name the bacteria:

## Shapes of Bacteria

▶ Bacteria vary in shapes:

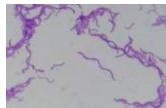
Rod shaped: *bacillus*, pl: bacilli



round shape: *coccus*, pl: cocci



Spiral shape: *spirillum*, pl: spirilli



Diplococci



Streptobacilli

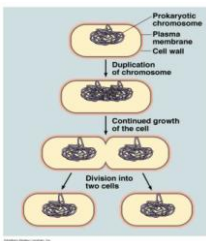


Staphylococci

## Reproduction

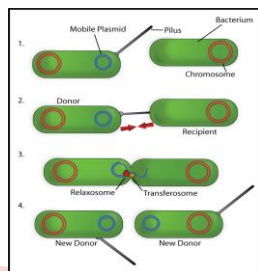
### 1. Binary Fission

Parent cell divides to produce two new daughter cells



### 2. Conjugation:

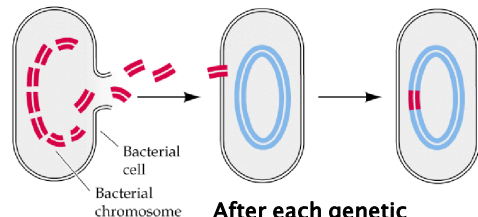
Two cells join to exchange genetic information



## Reproduction

### Transformation

A process in which bacterial cell takes in and uses pieces of DNA from its environment



After each genetic exchange, binary fission occurs

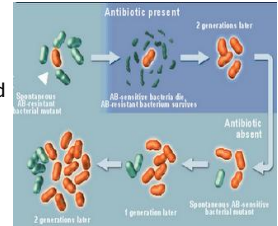
## Homework

- ▶ 390–399
- ▶ Questions 1,3,5,6
- ▶ Quiz on Friday:
- ▶ Includes: microscopes (labelling/function of microscope parts, size calculations)
- ▶ Taxonomy: Dichotomous keys, classical taxonomy (Linnean ranks), phylogeny and cladistics

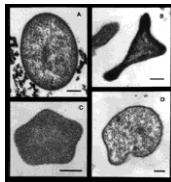
## Bacterial Diseases and Resistance

- ▶ Diseases caused by bacteria: Botulism, scarlet fever, tetanus, lyme disease
- ▶ **Antibiotics:** a way to fight off bacteria. A competition between microbes.

- ▶ **Antibiotic Resistance:** overuse of antibiotics can cause bacteria to adapt and become resistant so that antibiotics are no longer effective.



- ▶ **Domain Archaea** contains only Kingdom Archaea. > 400 described
- ▶ **Characteristics:** unicellular, prokaryotes
- ▶ Archaea are considered “extremists”
  - Hot temperatures = **thermophiles**
  - Cold temperatures = **psychrophiles**
  - Salty areas = **halophiles**



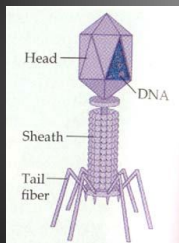
## What are Viruses

A virus is a non-cellular particle made up of genetic material and protein that can invade living cells.

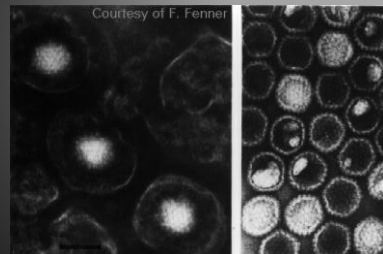
Viruses that infect bacteria are called bacteriophages.

Virus outbreaks can lead to epidemics. For example: Hep B, polio, HIV/AIDS

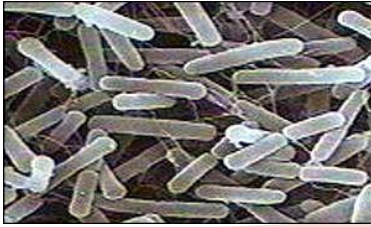
## T4 Bacteriophage



## Herpes Virus

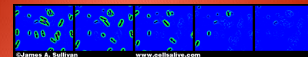
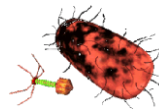


## Escherichia Coli Bacterium



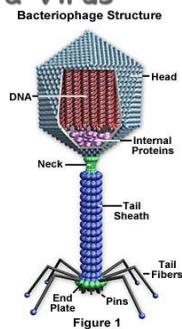
E. coli is a bacterium. That is a crude cell, it is not a virus because viruses are protein containers with DNA cores or RNA cores

## E. Coli and the Bacteriophage

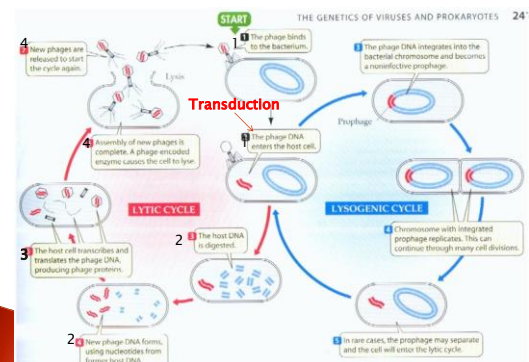


## The Structure Of a Virus

- Viruses are composed of a core of DNA or RNA
- The DNA or RNA is surrounded by a protein coat called a **capsid**
- The genetic information is either made up of DNA or RNA but never both



## Lytic and Lysogenic Infection cycles:



## Vaccines

- Vaccines are mixtures that contain weakened forms or parts of a dangerous virus, that are injected into an individual's body.
- This triggers a response by the immune system that will not cause an infection
- the immune system will store it in chemical "memory" in case of future exposure



Ex. Small pox vaccine, eradicated small pox, last known case was in 1977

## Prions

- Proteinaceous infectious particles
  - Cause a number of known rare diseases in mammals
  - Found in the brain and nervous system
  - Prions will infect normal proteins and effect proper function
  - Common example: BSE: bovine spongiform encephalopathy or "mad cow disease"



# Homework

