

# ARCHAEBACTERIA AND EUBACTERIA

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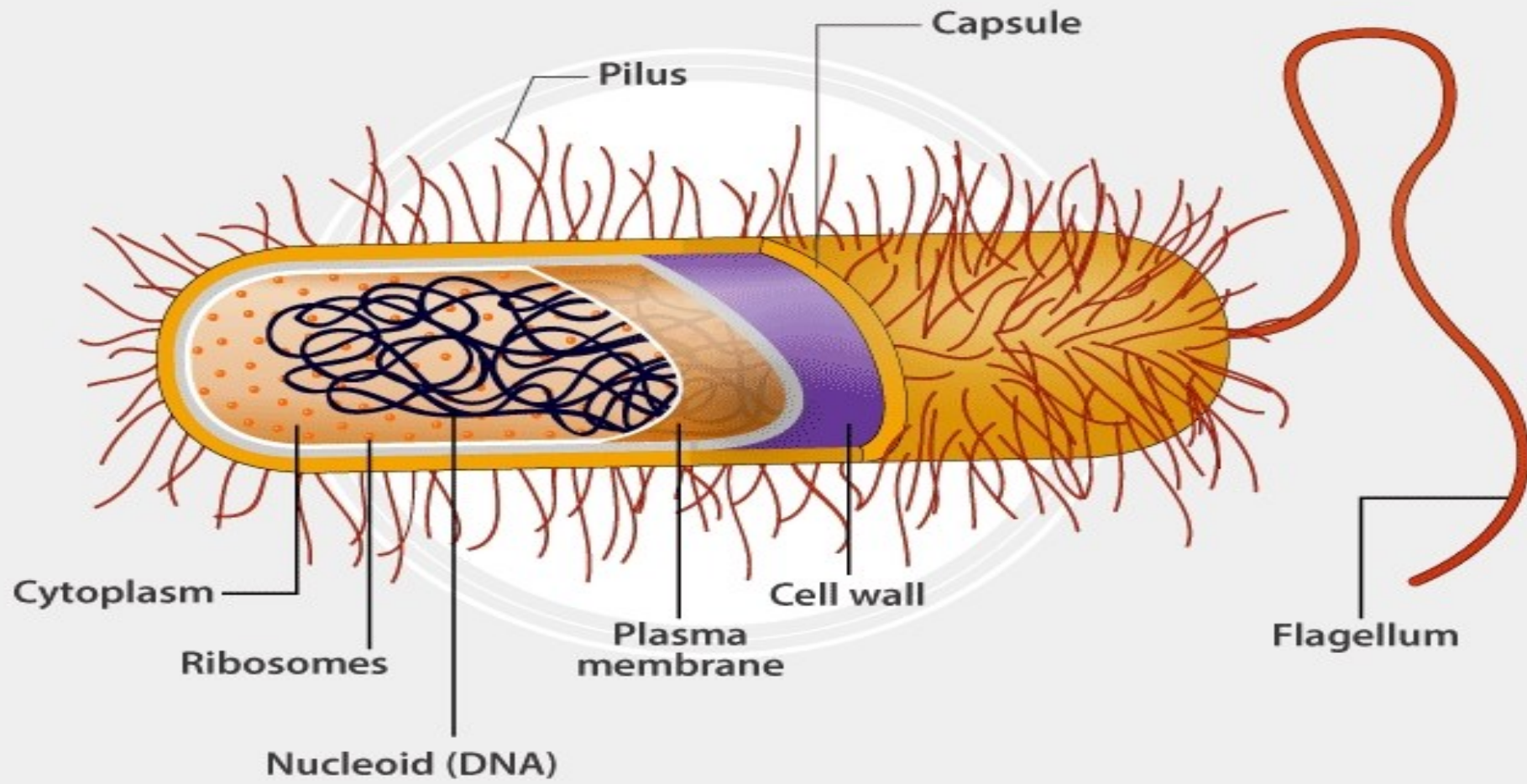
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# INTRODUCTION

- ▶ Archaeobacteria and eubacteria both lie under the kingdom Monera ( This kingdom contain least organized prokaryotic micro organism on earth ).
- ▶ They are simple in structure but are complex in behavior.
- ▶ They show most extensive metabolic diversity.

# ARCHAEBACTERIA



# ARCHAEBACTERIA

## CHARACTERS

- ▶ Archaeobacteria are also known as **ancient bacteria** as they evolved just after the first life on earth.
- ▶ Archaeobacteria are found in extreme environments where no other life can even exist.
- ▶ They contain **unmutated DNA** , so they are also called living fossils.

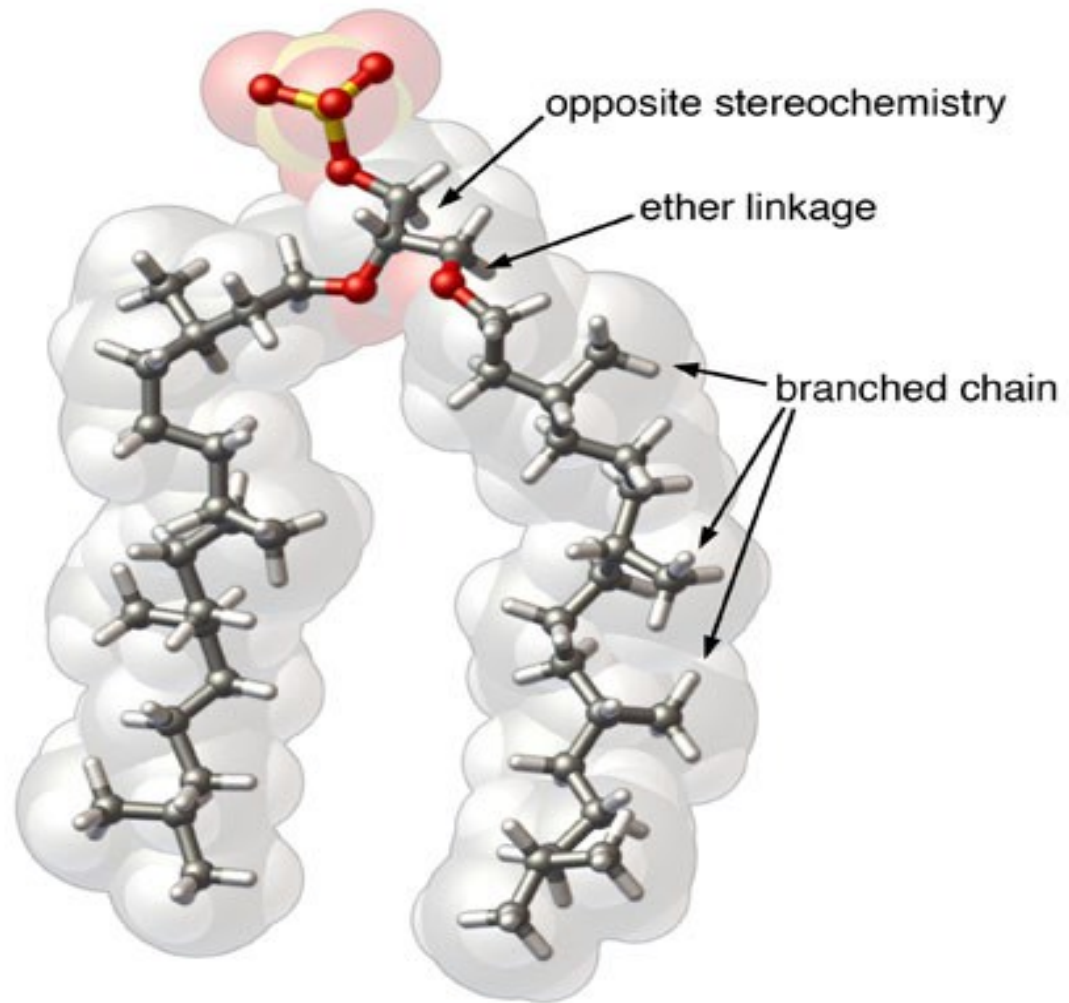
They play a vital role in **nitrogen cycle**.

- ▶ Archaeobacteria are further divided into - **METHANOGENS** , **THERMOPHILES** and **HALOPHILES** .

## ULTRA STRUCTURE

- ▶ Individual archaebacteria is 0.1 to 1.5 in diameter .
- ▶ Different shapes that they possess is **spherical** , **rod shape**, **spiral** and some are of **flat and square shape** .
- ▶ **CELL WALLS** - outermost layer
  - made up of **pseudo peptidoglycans** .
  - it contains **N- talosamine uronic acid** in place of NAM.
- ▶ **CELL MEMBRANE** - Ether linked
  - branched chain lipids , containing D- glycerol phosphate.
  - structure of membrane decreases membrane fluidity.

## Branched chain lipid in cell membrane of archaebacteria



## NUTRITION

Archaeobacteria uses different sources as a carbon source .

- ▶ During metabolic reaction one act as electron acceptor and other as electron donor .

Redox reaction takes place in these steps

- ▶ Energy is released in these steps and release Adenosine Triphosphate.
- ▶ some archaeobacteria under this are phototrophs.

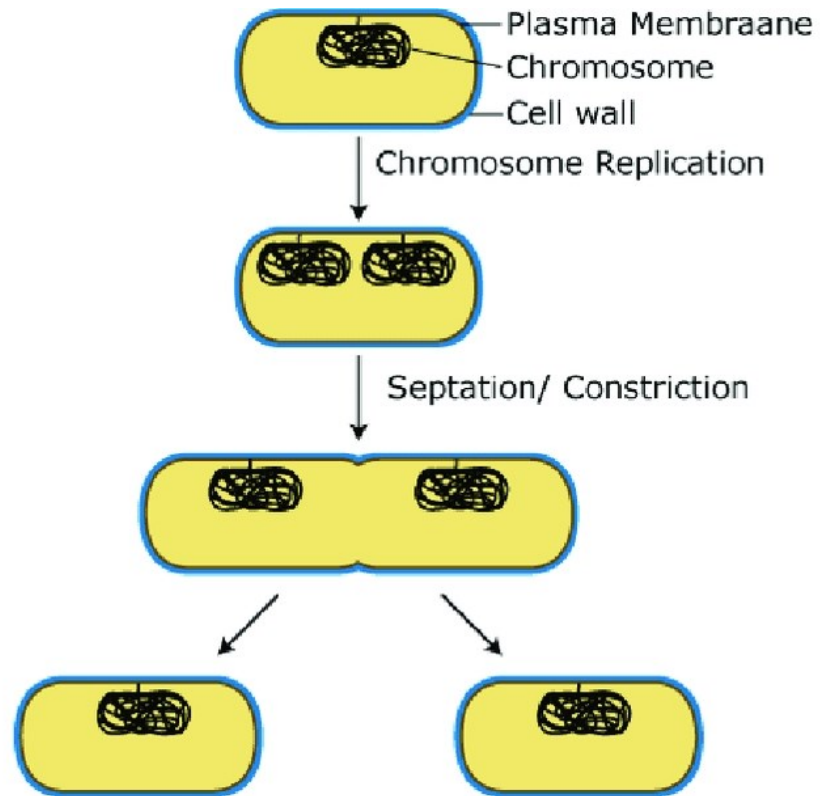


## REPRODUCTION

Archaeobacteria reproduces asexually **binary fission** ,  
**budding** and **fragmentation**.

- ▶ Archaeobacteria do not make spores

# Method of reproduction by BINARY FISSION



## Economic importance

- archaeobacteria such as methanobacterium are used in production of gobar gas.
  - They are used in bioleaching of minerals.
  - Archaeobacteria such as thermus aquaticus is used to obtain Taq polymerase enzyme which is used in recombinant DNA technology.
  - They are economically very important as they are helpful in biodegradation , bioremediation , and other environmental processes.
- They are also used for production of microbial fuel cells .

# EUBACTERIA

## Characters

- ▶ Also known as true bacteria.
- ▶ Eubacteria are more complex domain of kingdom monera.
- ▶ Found in most of the habitats on earth.
- ▶ All metabolic activities takes place in cytoplasm ( as they do not have membrane bound organelles)
- ▶ Some eubacteria are also involved in nitrogen cycle.
- ▶ They also exhibits both parasitic and pathogenic effect.

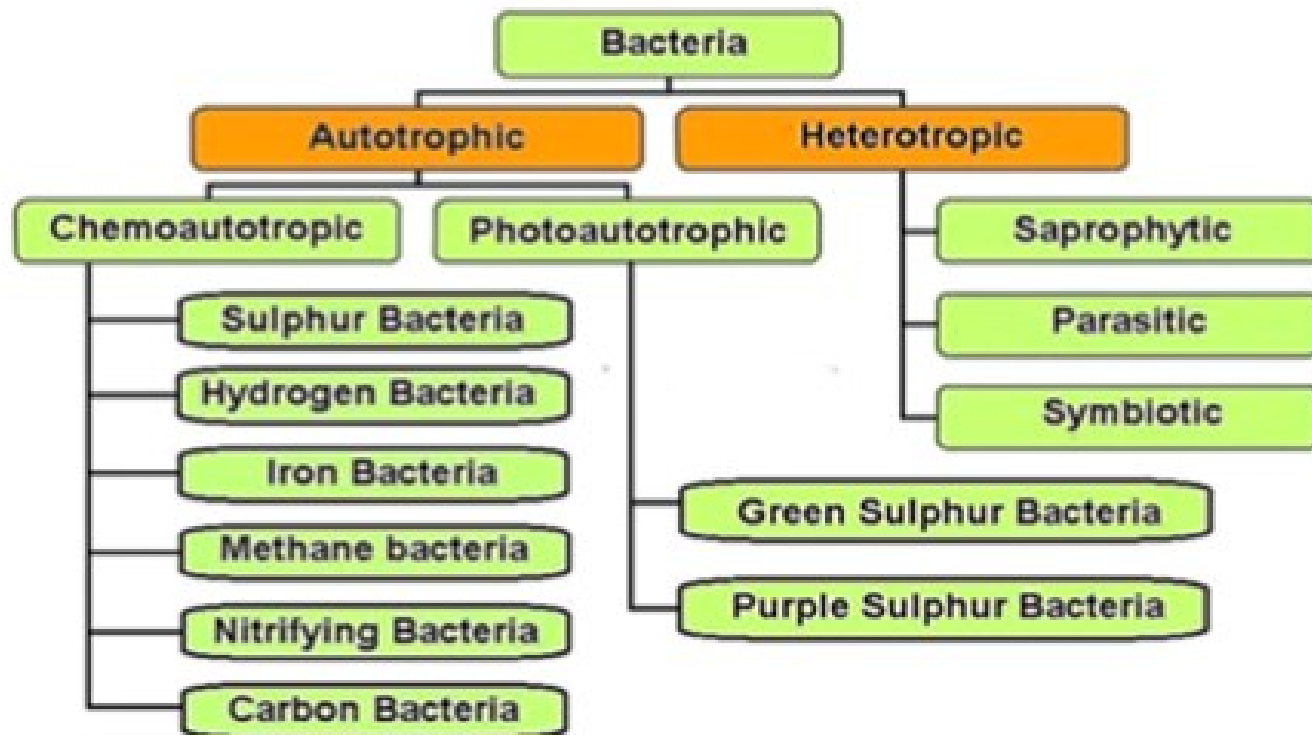
## ULTRASTRUCTURE

- ▶ Individual eubacterium is 0.5 to 5 micrometer in diameter.
- ▶ They exhibit a variety of shapes
  - Cocci and bacilli are the major shapes
  - vibrio, rods and filaments and spirochaetes are other shapes of eubacteria
- ▶ CELL WALL - Outermost layer (inner to glycocalyx)
  - composed of peptidoglycan with Muramic acid.
- ▶ CELL MEMBRANE - Ester linked
  - straight chain of fatty acids containing L-glycerol phosphate.

## NUTRITION

- ▶ Eubacteria can be phototrophs , saprophytes , symbiosis.
- ▶ Of the heterotrophs , the majority are saprophytes .
- ▶ There are many autotrophic bacteria  
( They may be photosynthetic or chemoautotrophs )
- ▶ Cyanobacteria are the largest group under eubacteria .

► BACTERIAL NUTRITION



## ECONOMIC IMPORTANCE

- ▶ Eubacteria plays an integral role in human gut in digestion process.
- ▶ Helps in synthesis of Vit. K
- ▶ Helps in nitrogen fixation in living systems.
- ▶ It has major contribution in pharmaceutical industry.
- ▶ They help in decomposition of dead and organic matter.
- ▶ They Helps in maintaining ecological balance .
- ▶ Eubacteria changes forms of oxygen , phosphorus , nitrogen , carbon into absorbable forms.



## REPRODUCTION

- ▶ Usually they reproduce by process of binary fission .
- ▶ Eubacteria irrespective of archaebacteria also forms spores.
- ▶ Spores do not reproduce directly but they are the method to overcome the unfavorable environment.
- ▶ Sexual reproduction is absent.

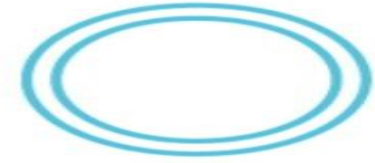
# GENETIC RECOMBINATION

- ▶ Due to the absence of sexual reproduction in bacteria , genetic recombination by this method is impossible
- ▶ Bacteria found a bypass for the genetic recombination apart from sexual reproduction.
- ▶ These methods for genetic recombination and to bring out variations are -
  - TRANSFORMATION
  - TRANSDUCTION
  - CONJUGATION

# TRANSFORMATION

- ▶ In this process a bacterium takes DNA from its environment.
- ▶ In lab it may be introduced by scientists
- ▶ Bacteria undergoing transformation can take up gene and may or may not constitute the changes.

Plasmid

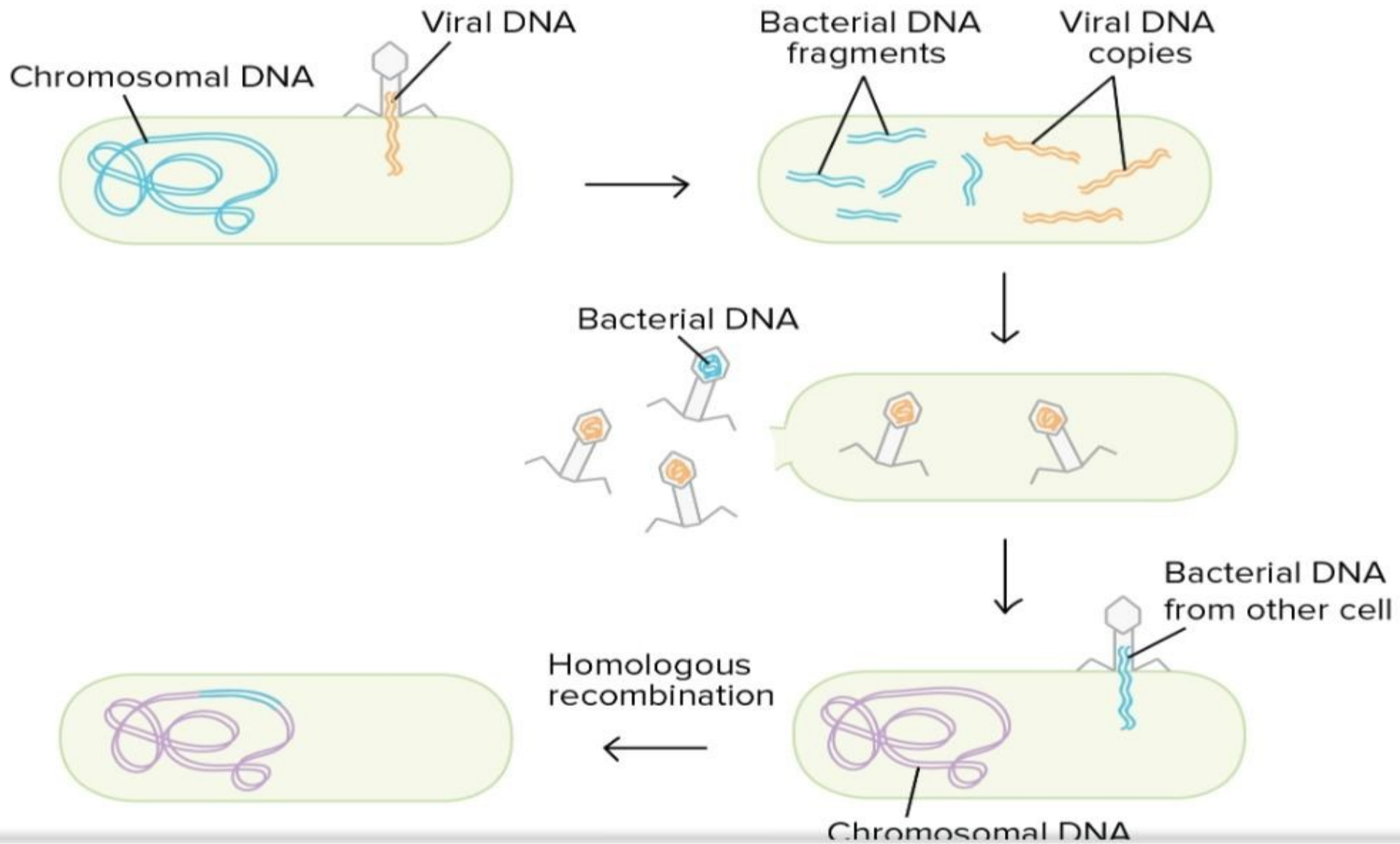


Chromosomal DNA



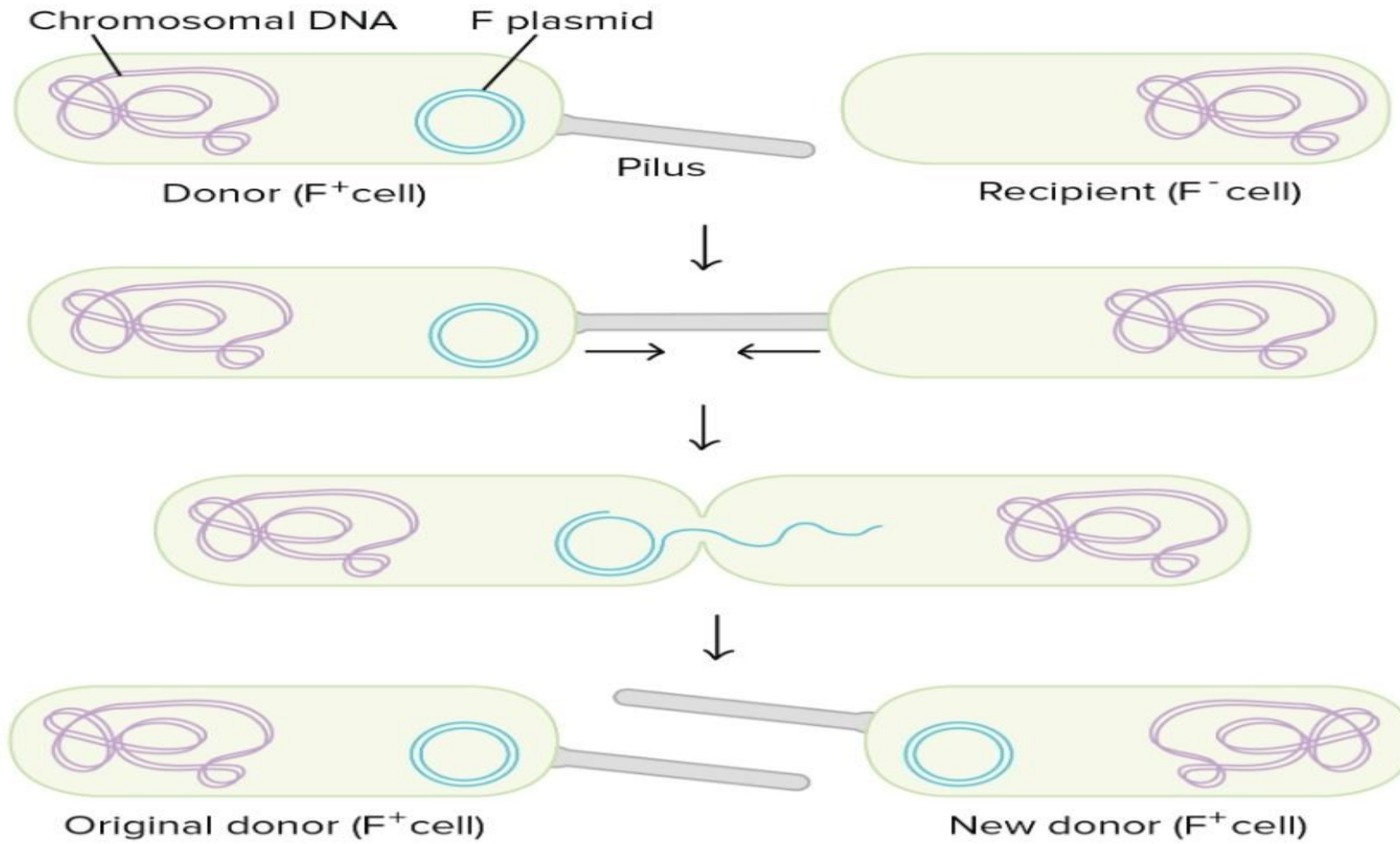
# TRANSDUCTION

- ▶ In transduction, bacteriophage move short pieces of chromosomal DNA from one to another
- ▶ Bacteriophage like other viruses commands a cell resource and use them to make a new bacteriophage .
- ▶ So , here transfer of DNA takes place by the help of bacteriophages
- ▶ Some bacteria phage chop the DNA of their hosts into pieces , making transfer process more likely.
- ▶ Archaea and other groups are not infected by bacteria phage, they have their own viruses.



# CONJUGATION

- ▶ In conjugation, DNA is transferred from one bacterium to another via conjugation tube ( pilus )
- ▶ Here one bacteria act as a donor and other as a recipient.
- ▶ Donor cells typically have fertility factor ( F factor ) which make them act as donor i.e They act as male bacteria
- ▶ Via conjugation tube They transfer their DNA to another and passed their maleness to other
- ▶ If f factor get attached to genome , they are known as episome.  
Their maleness increases by 1000 times as compared to other .





**THANKING YOU**