

# Molecular Biology



## The Genetic Material

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# Genetic material

- Substance that carries biological information
- For the entire development and properties of organisms
- From parents to progenies
- From generations to generations

# Properties of Genetic material

1. Ability to store and transmit Biological information in a stable and coded form
2. Ability to replicate with high accuracy
3. Ability to distributes copies equally to progenies with minimum error
4. High Physical and chemical stability
5. Potentiality to generate variations to generate genetic diversity
6. Ability to decode and express in the progenies

# What leads to the Discovery of DNA as Genetic Material ?

1869 — Friedrich Miescher

Oscar — 1884

Hertwig

1889 — Richard Altmann

Frederick Griffith — 1928

1944 — Avery, McCarty,  
MacLeod

Erwin Chargaff — 1950

Hershey, Chase — 1952

1953 — Watson  
Crick

Frankel-Contrat, Singer, Schramm — 1957

Great studies discoveries and  
progress in Molecular Biology

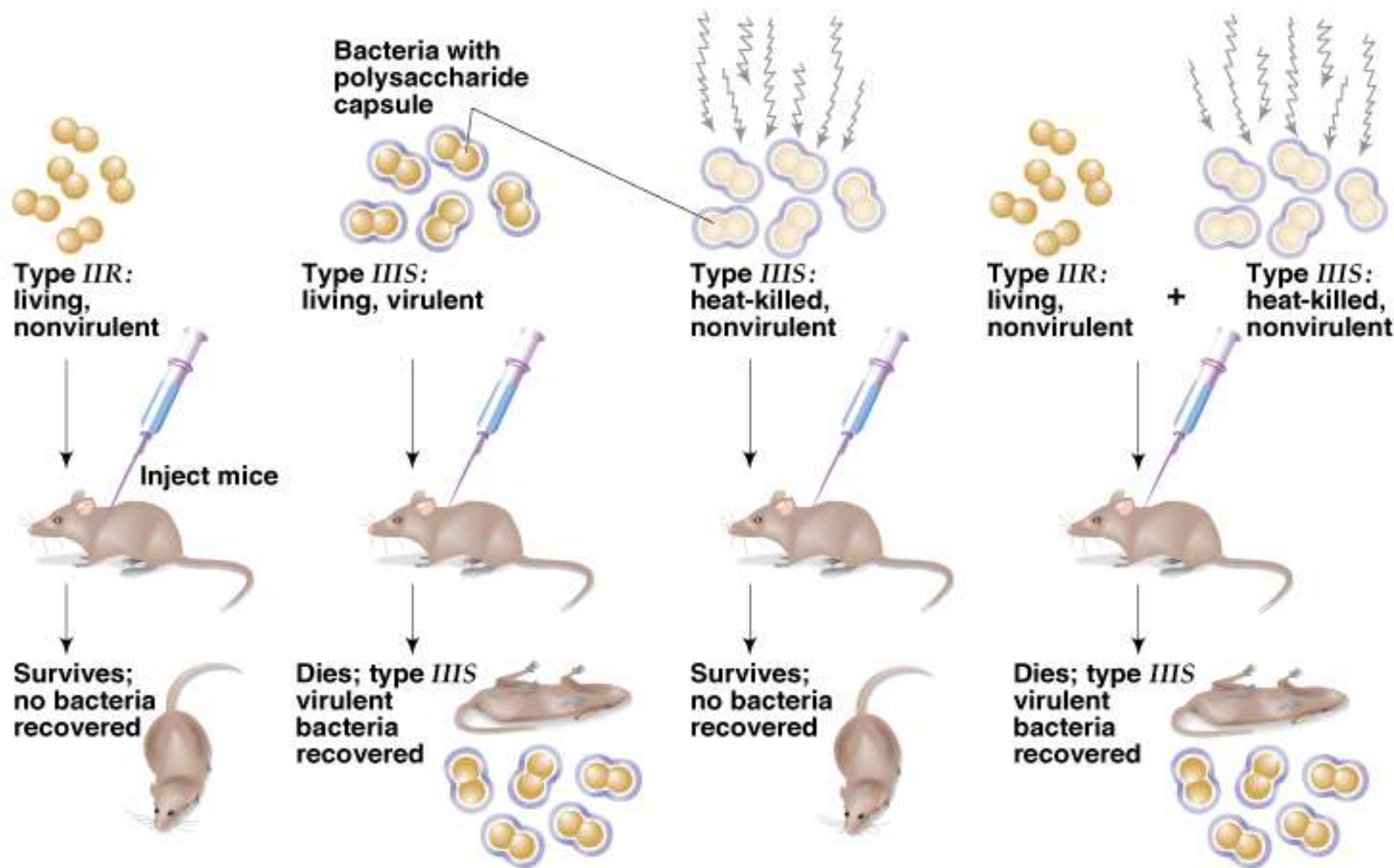
2020

# Evidence from the study of

## **BACTERIAL TRANSFORMATION**

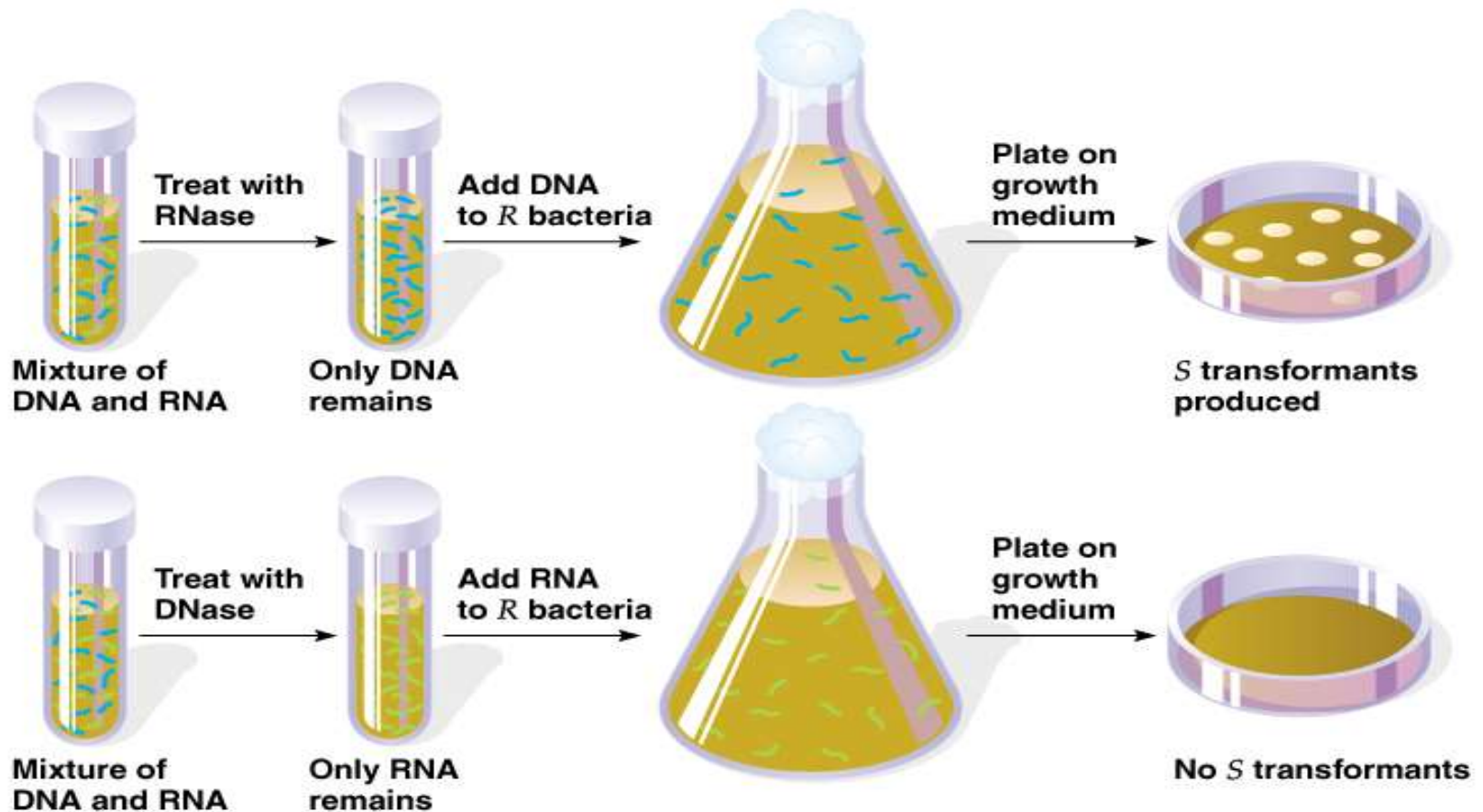
- Griffith's Experiment
- Transformation-Direct transfer of genetic material from one bacterium to another
- “transforming principle” demonstrated with *Streptococcus pneumoniae*





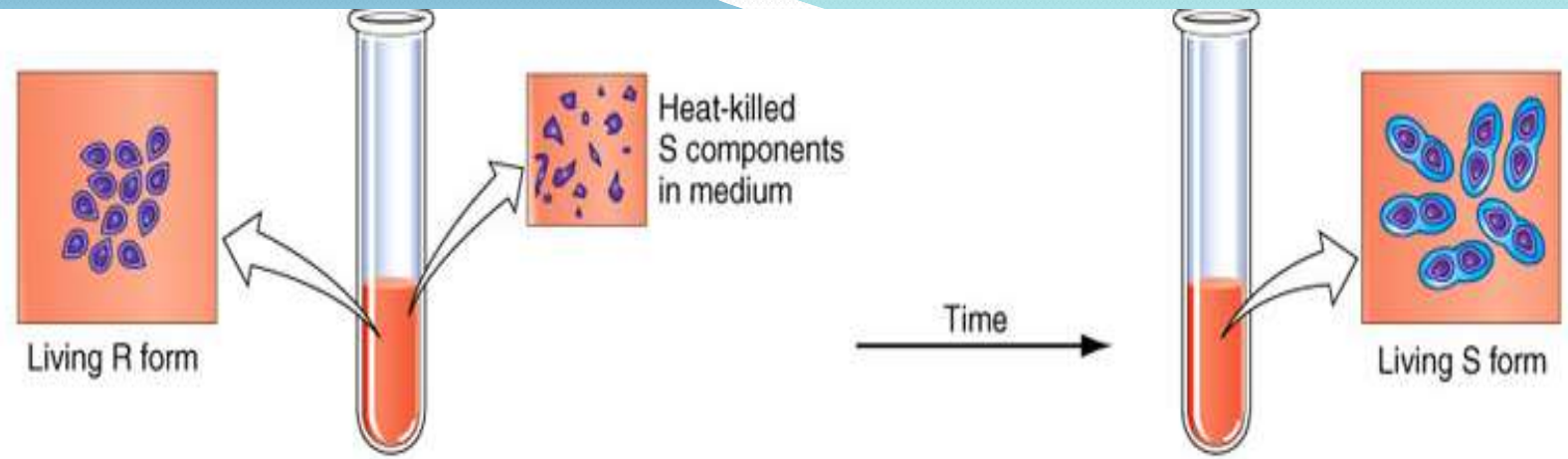
# Experiments of

## Avery, MacLeod and McCarty

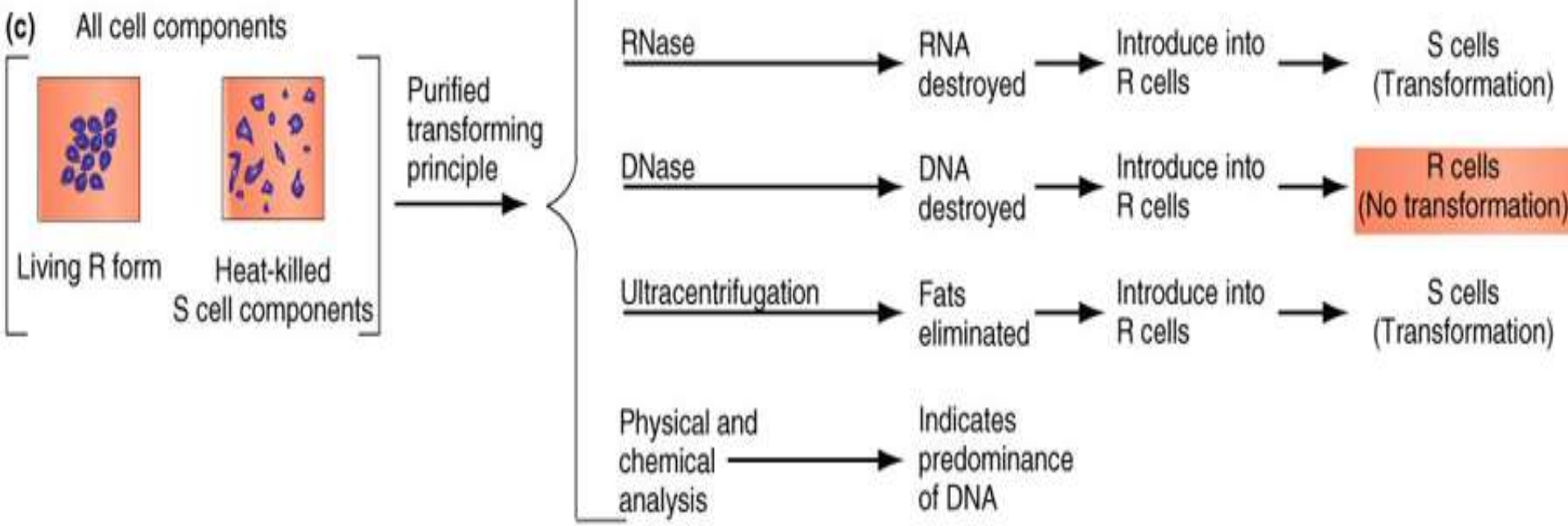




(a)



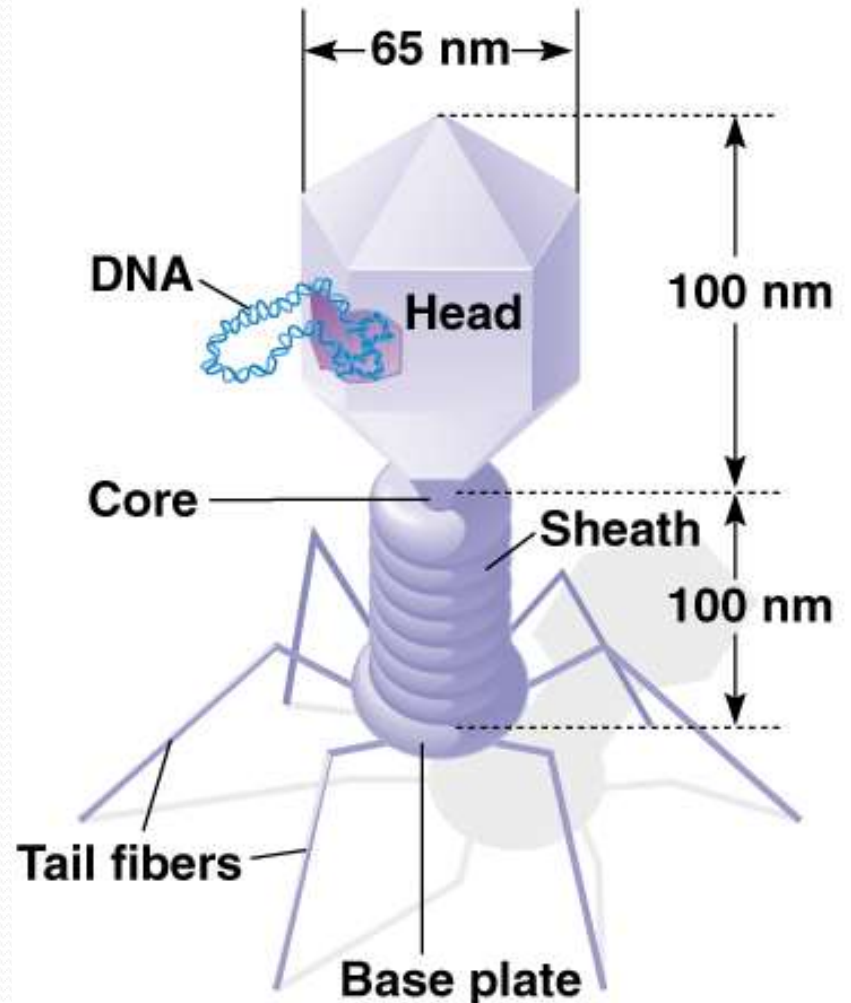
(c)



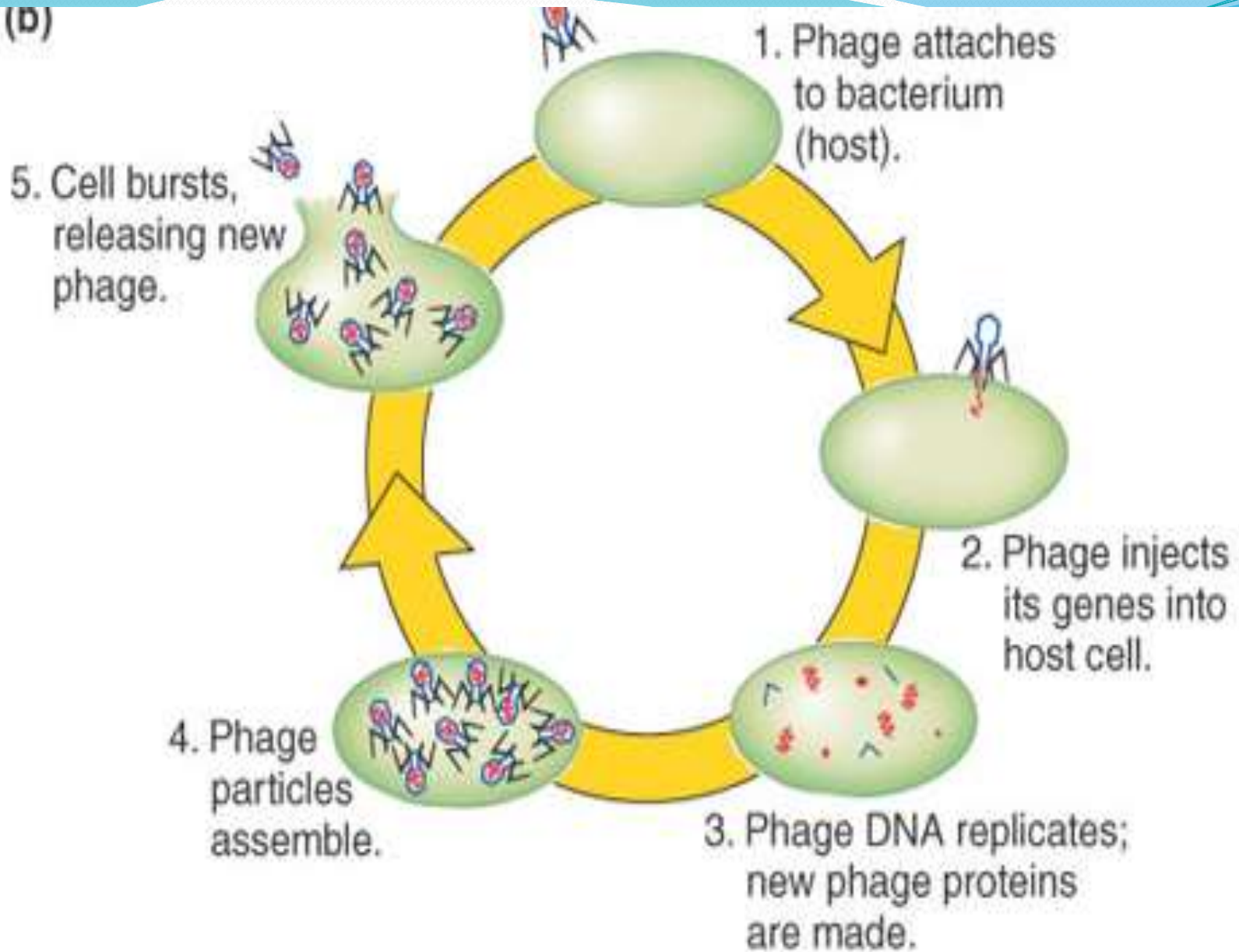
# Evidence from the study of

## **BACTERIAL TRANSDUCTION**

**Bacteriophage**  
**Virus that attacks**  
**bacteria and**  
**replicates by**  
**invading a living**  
**cell and using the**  
**cell's molecular**  
**machinery**



(b)



T2 bacteriophage is composed

of DNA and proteins:

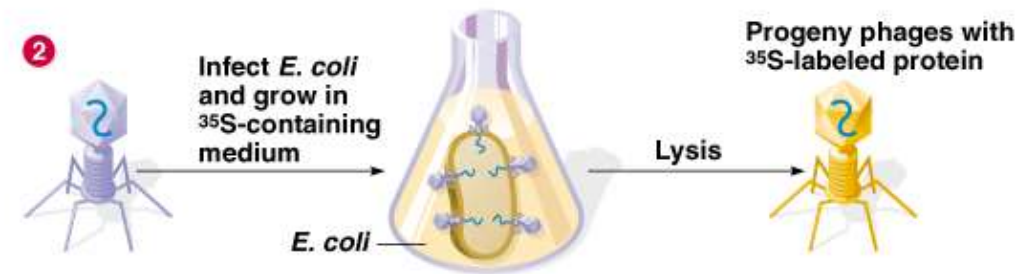
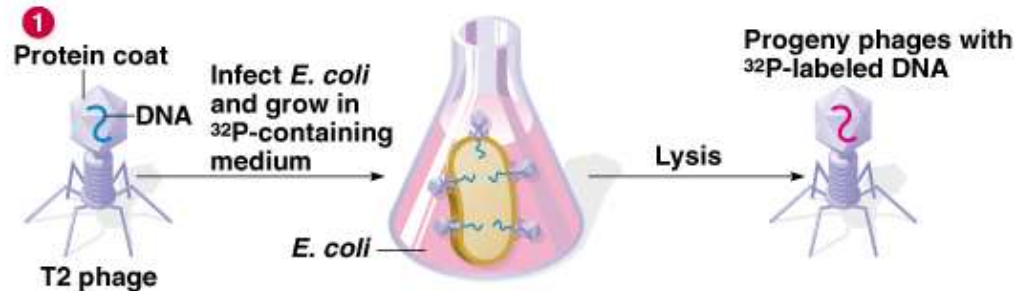
Set-up two replicates:

- Label DNA with  $^{32}\text{P}$
- Label Protein with  $^{35}\text{S}$

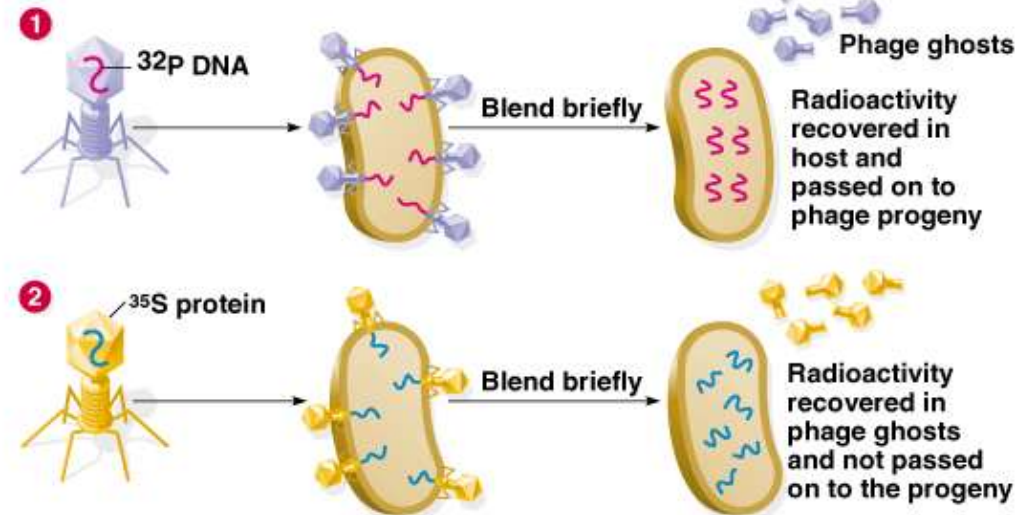
Infected *E. coli* bacteria with  
two types of labeled T2

$^{32}\text{P}$  is discovered within the  
bacteria and progeny  
phages, whereas  $^{35}\text{S}$  is not  
found within the bacteria  
but released with phage  
ghosts.

a) Preparation of radioactively labeled T2 bacteriophage



b) Experiment that showed DNA to be the genetic material of T2



# Thank you

**This class prepared for  
Fifth Semester BSc Botany Students  
Little Flower College, Guruvayur  
Affiliated to University of Calicut**

- Next Class
- Nucleic acids
- Nitrogen bases
- Nucleosides
- Nucleotides
- Polynucleotides