

Microbial Genetics – TD 4 Bacterial Transduction**Exercise 1— General Concepts of Transduction**

1. What is transduction?
2. What is the role of the bacteriophage?
3. What are the two major types of transductions described in the course?

Exercise 2 — Generalized Transduction

1. Which type of bacteriophage carries out generalized transduction?
2. What happens to the bacterial chromosome during infection?
3. How does bacterial DNA accidentally enter a phage particle?
4. What happens when this particle infects another bacterium?
5. Can any bacterial gene potentially be transferred?

Exercise 3 — Specialized Transduction

1. What type of phage is required for specialized transduction?
2. What is a prophage?
3. How does specialized transduction occur?
4. Which bacterial genes are preferentially transferred?
5. Why is specialized transduction highly efficient for these genes?

Exercise 4 — Generalized vs Specialized Transduction

Complete the comparison:

Feature	Generalized transduction	Specialized transduction
Phage type		
Bacterial DNA transferred		
Main error		
Frequency		
Prophage required		

Exercise 5 — Experimental Reasoning

A bacterium is infected by a bacteriophage. A small proportion of the resulting phage particles contain bacterial DNA instead of phage DNA.

1. What type of transduction is this?
2. What caused the bacterial DNA to enter the phage particle?
3. Can the resulting transducing particle transfer bacterial DNA to another cell?
4. What happens to the transferred DNA in the recipient?

Exercise 06 — Case Study

A lysogenic phage is integrated into a bacterial chromosome between genes A and B. During excision, the phage accidentally removes gene A with its DNA.

1. What type of transduction is involved?
2. Why is gene A preferentially transferred?
3. What caused the transfer of gene A?
4. What happens when the transducing phage infects a recipient cell?
5. How can gene A become stably incorporated into the recipient chromosome?

Synthesis Problem

A bacterial strain contains an integrated F plasmid. During conjugation, bacterial chromosomal genes are transferred to a recipient. In another experiment, a bacteriophage transfers bacterial DNA between two cells.

1. What mechanism is responsible for the first experiment?
2. What mechanism is responsible for the second experiment?
3. What is the main difference between them?
4. If any bacterial gene can potentially be transferred by the phage, what type of transduction is involved?
5. If only genes close to the prophage integration site are transferred at high frequency, what type is involved?