

c) Transduction :— Zinder and Leder Berg (1952) discovered transduction in Salmonella sp. In this type of recombination transfer of genetic material from one bacterium to another takes place by a bacteriophage hence it is also known as phage mediated genetic transfer.

Transduction may be of two types viz
i) Generalized and ii) Specialized.

i) Generalized transduction. — Phage mediated transduction of a small segment of DNA from any region of the bacterial genome is called generalized transduction. The process begins when a phage enters the lytic cycle and progeny phages subsequently infect and lysis a bacteria. During infection the bacterial DNA is degraded into small fragment and the viral DNA is replicated. When lysis of the bacterial cell occurs, the phages pick up a small piece of bacterial DNA from the lysed bacterial cell. Such a piece of bacterial DNA may be implanted in other bacterial cell by transducing phage. Therefore the transduce DNA fragment is incorporated into the DNA of recipient bacterium resulting in the formation of a recombinant strain.

During transduction if the donor DNA of donor bacteria combines with its homologous region of the recipient bacterial chromosome, the transduce genes replicate as a part of chromosome and pass into the daughter cell. This is called complete transduction. But when the transduce gene remains free in the cytoplasm of recipient bacteria and not under go replication it is called abortive transduction.

ii) Specialized transduction — In specialized or restricted transduction in particular bacterial phage transverse only certain genes from one bacterium to another. When a phage genome is introduced in the bacterial cell it becomes integrated with bacterial chromosome as prophage. Upon induction the DNA becomes free containing a small segment of bacterial chromosome. After assembly of phage DNA + bacterial chromosome the bacteriophage is released from the host. Usually these phage is defective and lacks some parts of its attachment site. When this defective virus infect a bacteria it introduces its DNA containing a piece of bacterial chromosome.

i) Differences between Generalized and Specialized Transduction.

Am. Generalized

i) In this process a small segment from any region of the bacterial chromosome is transduced.

ii) It is possible when lysates produced by lytic infection.

iii) It is useful in chromosome mapping.

Specialized

i) In this process certain genes of the bacterial chromosome is transduced.

ii) It is possible only with lysates produced by the induction of the prophage.

iii) It has no important in chromosome mapping.

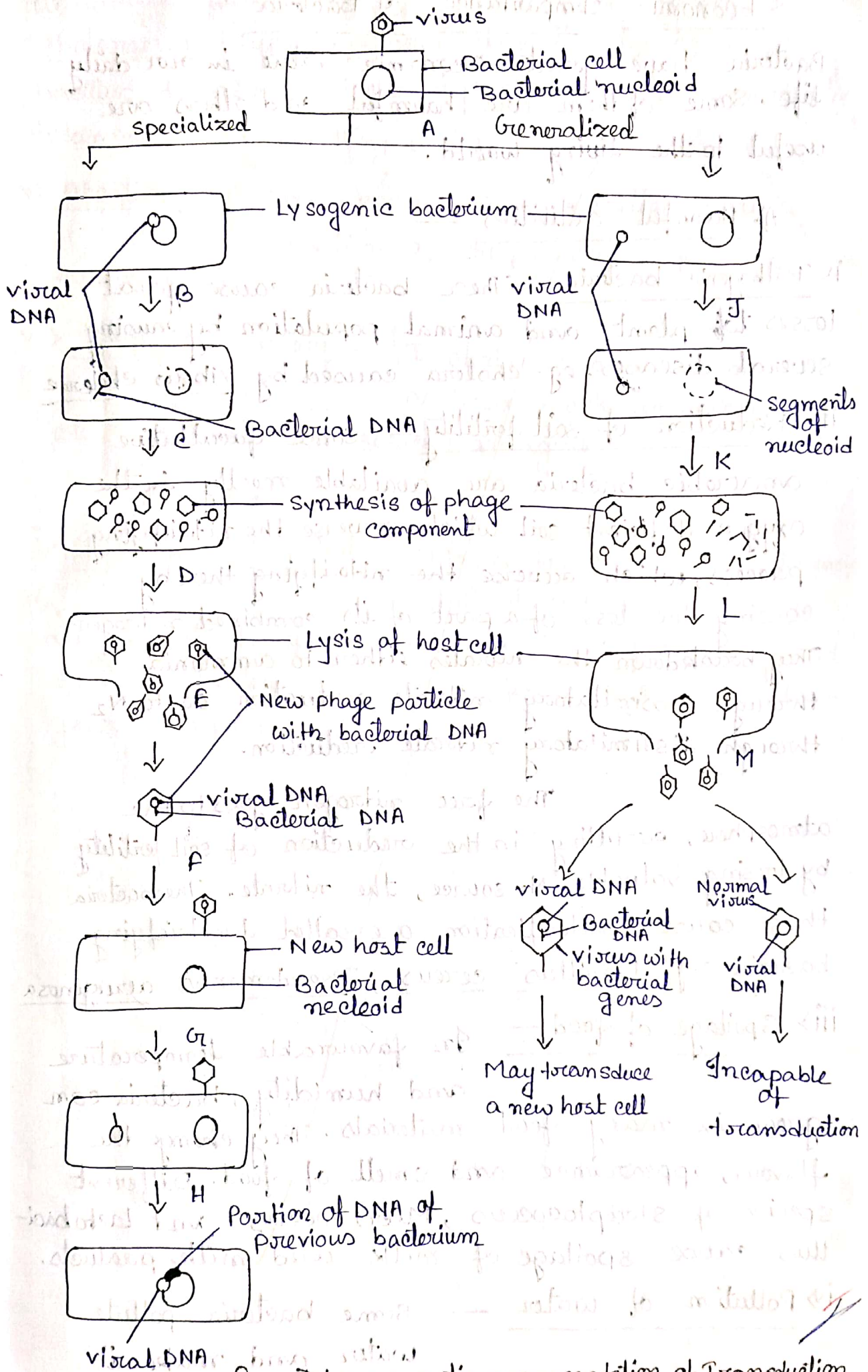


Fig: - Diagrammatic representation of Transduction