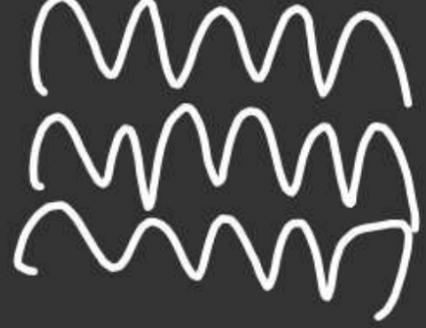


Science & Technology

By Dr. Abhishek Sir





, their cells, genetic material
or some biomolecules for obtaining
a

Product

Service

for human welfare.

Parts of modern biotechnology

→ ① Recombinant DNA Technology
↳ GM Tech.

→ ② Genome Analysis

③ Gene amplification & Diagnostics

④ Gene Therapy ⑤ Stem cells ⑥ Cloning

⑦ Protein Technology

↳ focuses on manipulations at

1) Cellular level

2) Genetic material level

3) Other biomol. level



Tobacco Mosaic Virus
— The first virus to be isolated & studied

Hep-C

- Zika Virus ✓
- Chikungunya Virus
- Ebola virus
- West Nile Virus
- Nipah virus

RNA Viruses

- SARS-CoV2
- All other SARS-CoV
eg. MERS
- HIV
- Polio Virus
- Dengue Virus

rDNA

2 DNA \rightarrow A DNA with a segment of another DNA



Host DNA



Foreign DNA



rDNA



2 types of enzymes

for rDT

Cut

(1) Restriction
Endonucleases

Cuts the DNA at a
particular target site

Paste

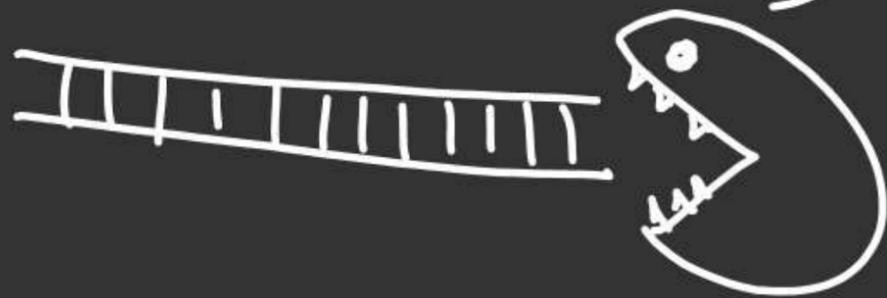
(2) Ligase

Pastes/joins
2 segments
of DNA

Types of nucleases

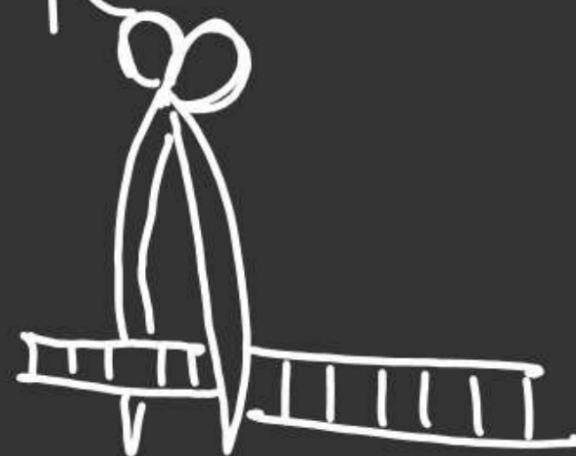
Exonucleases

(Cutting / digesting from outside)



Endonucleases

Cutting from inside



Restriction Endonuclease

- 3 types → But, only Type-II used in RDT
- Occurs naturally in bacteria
- very accurate
- ↳ Restricts viral infection.

Sources of foreign DNA

Other sp.

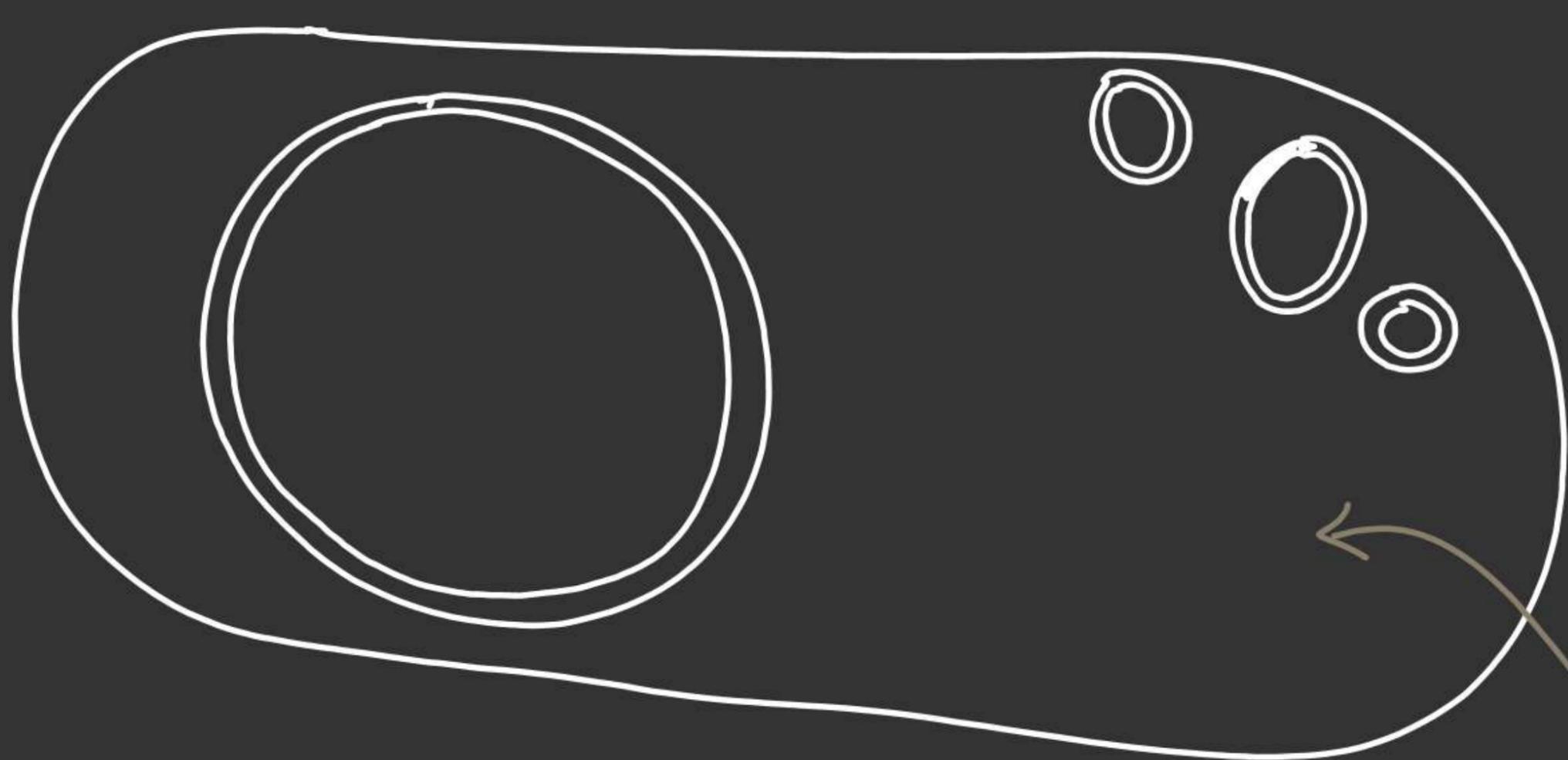
Transgene

↓ transfer

Transgenic Organism

Same sp.

In case of
Gene Therapy

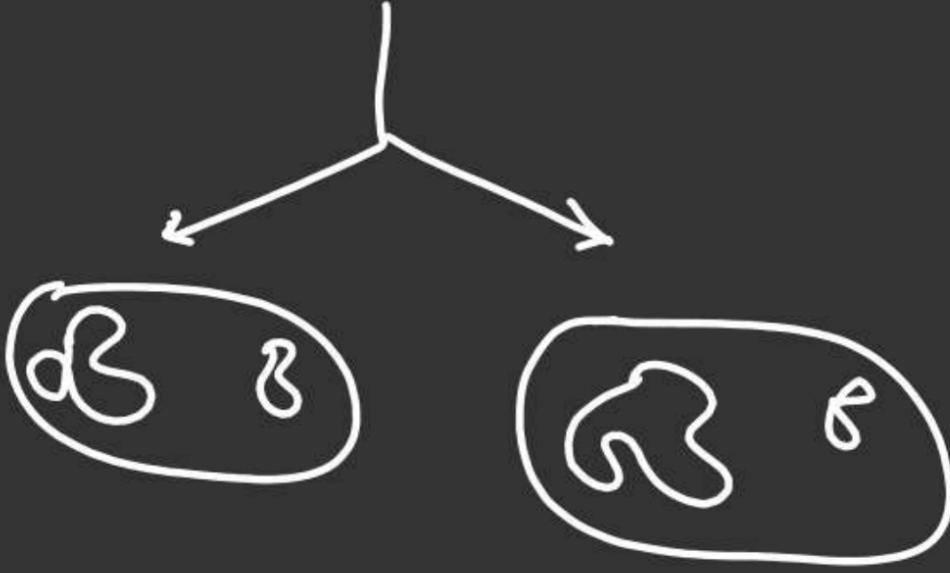


PEN



Transfer





(1) Take the gene of interest → Isolate with help of Restriction Enz. (RE)

(2) Cut the vector with RE

→ a piece of DNA (or RNA) that can carry the gene of interest to a target cell

(3) Join 1 & 2 with help of ligase

↓
(4) Transfer the r-Vector into
the target cell

↓
(5) Check with help of
Marker / Reporter gene

↓
(6) Culture the transformed
bacteria

Applications

(1) Enzymes, Hormones & Proteins of medicinal importance

↳ Insulin

→ Human Growth Hormone

→ Tissue Plasminogen Activator (TPA)

(2) Proteins for nutritional support

(3) Development of vaccines

(4) Food processing industry →
Dairy industry

(5) Environmental Remediation

Transgenic Animals

↓
An animal with
a transgene (Foreign
Gene)

How to produce?

Gametic
Transfer

Zygotic
transfer

Early
embryo
transfer

After the gestation period



Birth of a transgenic
animal

Applicⁿ

- (3) Biopharming
- (4) Faster growing & healthier cattle
- (5) Xenotransplantation

- (1) ↑ the quantity of animal product
- (2) Enhancement of animal product quality