

# Cosmids

Cosmids are **hybrid plasmid vectors** that contain **cos (cohesive) sites** of bacteriophage  $\lambda$ , allowing them to be packaged into phage particles for efficient DNA cloning. They are widely used in molecular biology for cloning large DNA fragments (up to **45 kb**).

## Structure of Cosmids

Cosmids combine features of both **plasmids and bacteriophage  $\lambda$**  and typically contain:

1. **Ori (Origin of replication)** – Enables replication in host cells.
2. **Selectable marker** – Usually an **antibiotic resistance gene** for selecting transformed cells.
3. **Multiple Cloning Site (MCS)** – A region with restriction sites for inserting foreign DNA.
4. **cos sites** – Derived from bacteriophage  $\lambda$ , these help in packaging DNA into phage particles.

## Properties of Cosmids

- Can carry **larger DNA fragments** than regular plasmids (up to ~45 kb).
- Use **cos sites** to package recombinant DNA into phages, making **transduction** (infection-based transfer) possible.
- Replicate as plasmids in *E. coli*, ensuring stable maintenance.

## Applications of Cosmids

- Used in **genomic library construction**, helping scientists store large fragments of DNA.
- Useful for **chromosome mapping** and **cloning large genes**.
- Serve as a **bridge between plasmids and bacteriophage  $\lambda$**  in recombinant DNA technology.