

Genetic Engineering

Biology

Moving a gene into another organism, step by step.

Classic recombinant DNA technology.

1

Isolate the gene

By restriction digest, PCR, or reverse transcription from mRNA.

2

Insert into a vector

Plasmid cut with the same restriction enzyme; ligase seals it.

3

Transform the host

Heat shock or electroporation makes cells take up the plasmid.

4

Select transformants

Antibiotic resistance marker; only transformed cells survive.

5

Express and harvest

The host produces the protein.

STICKY ENDS

Restriction enzymes cut at palindromic sites

Staggered cuts leave complementary overhangs

The same enzyme on gene and vector makes them join

Human insulin was the first recombinant pharmaceutical, approved in 1982 and produced in *E. coli*.