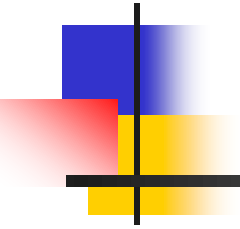


PRINCIPLES OF BIOTECHNOLOGY

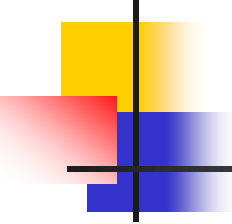


PRINCIPLES OF BIOTECHNOLOGY



Pest resistant plant





Birth of Biotechnology

Genetic engineering-

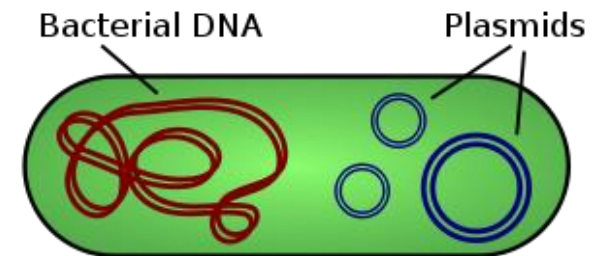
Techniques to alter the chemistry of DNA & RNA
(Introduction into host organisms)

Chemical engineering-

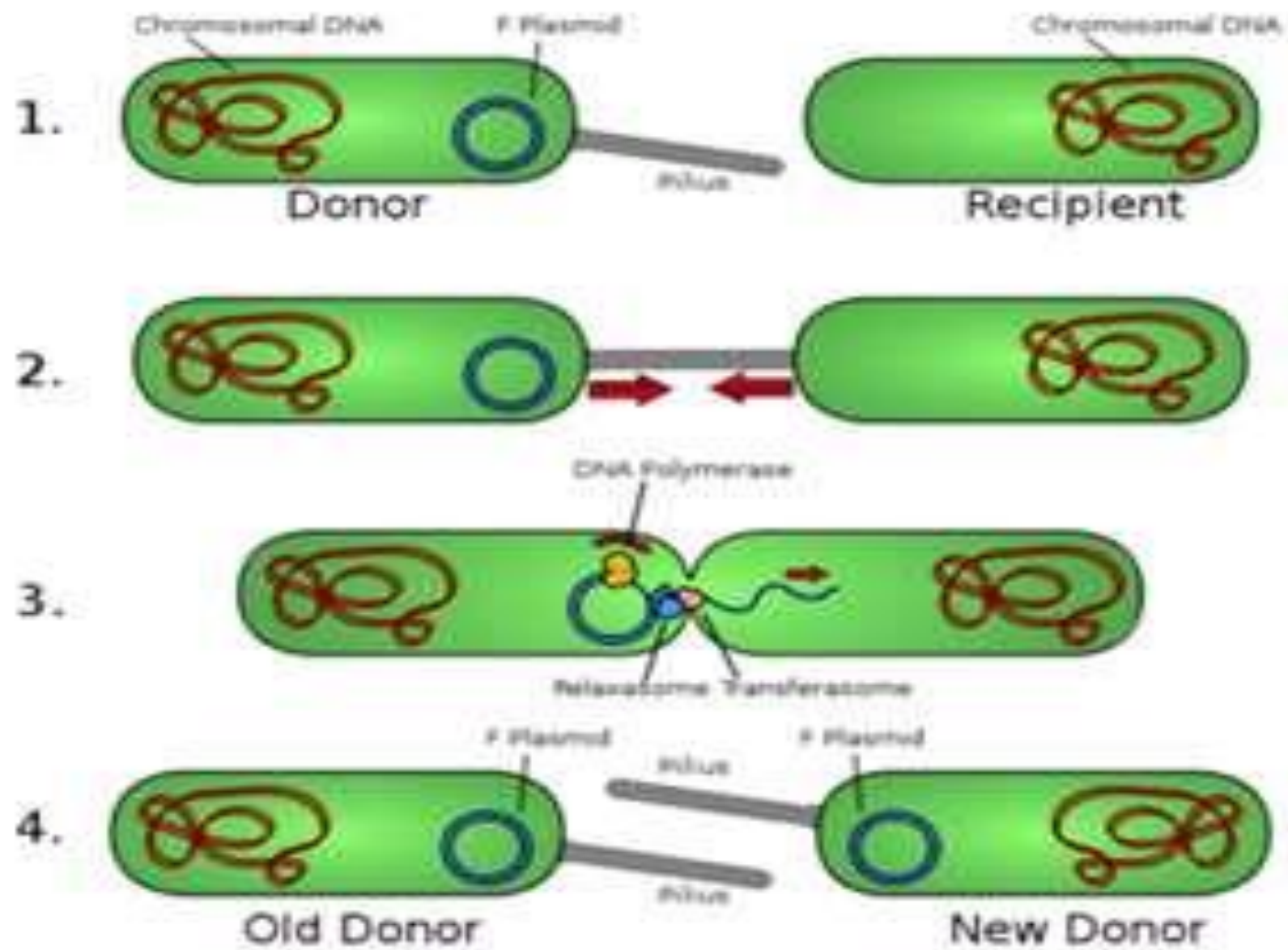
Maintenance of sterile ambience to enable growth of the desired microbe in large quantities for the manufacture of vaccines, antibiotics and enzymes.

Plasmid

- a **plasmid** is a DNA molecule that is separate from, and can replicate independently of, the chromosomal DNA. They are generally circular. Plasmids usually occur naturally in bacteria.
- A plasmid contains 'bonus DNA' with information resulting in some type of survival advantage and sometimes antibiotic resistance. Bacteria can also share plasmids with each other thus increasing the chance of resistance to antibiotics

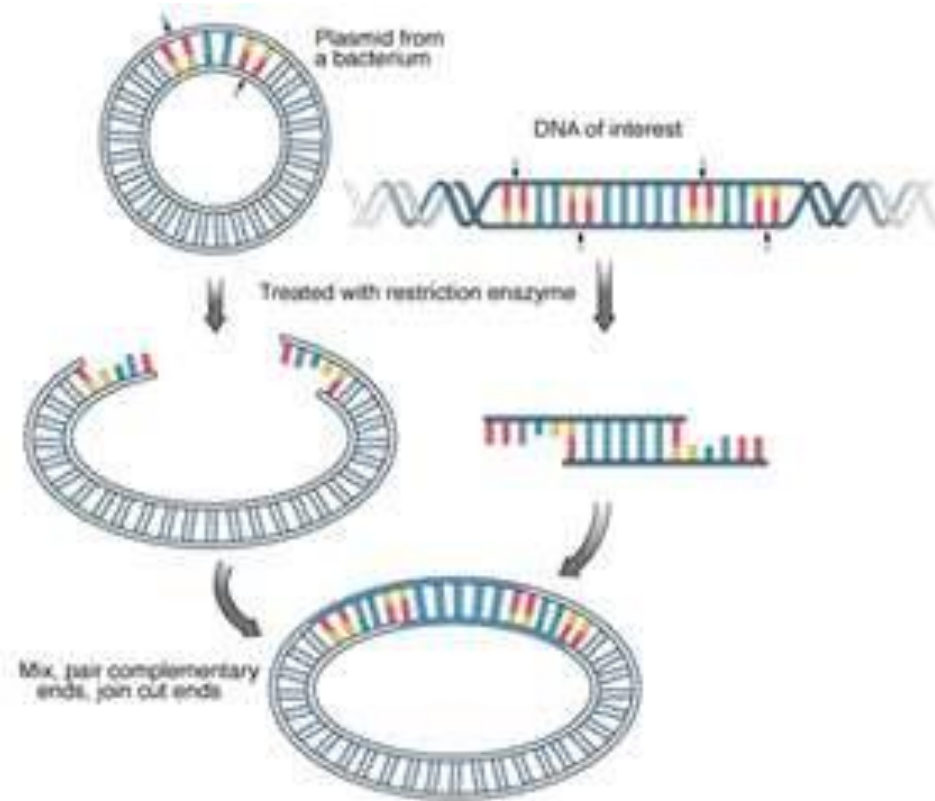


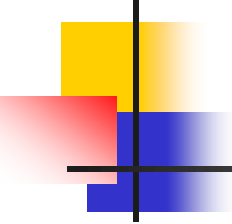
The genetic material of a plasmid does not contain information necessary for the day to day functioning of the cell.



Genetic engineering-

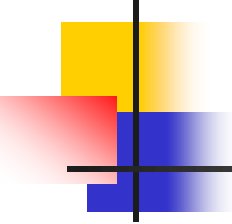
- Recombinant DNA
- Gene cloning
- Gene transfer





Recombinant DNA

- **Recombinant DNA** (rDNA) molecules are DNA sequences that result from the use of laboratory methods (molecular cloning) to bring together genetic material from multiple sources, creating sequences that would not otherwise be found in biological organisms.

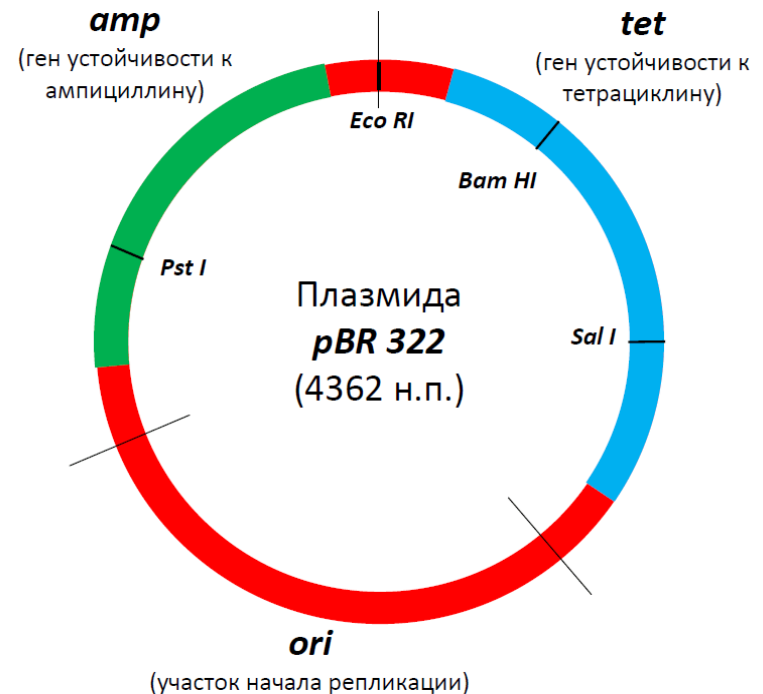


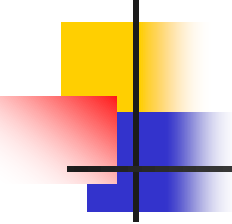
Gene Cloning

The method involves the replication of a single DNA molecule starting from a single living cell to generate a large population of cells containing identical DNA molecules. Molecular cloning generally uses DNA sequences from two different organisms

Cloning Vector" is an agent that can carry a DNA fragment into a host cell.

- **pBR322** is one of the most commonly used *E. coli* cloning vectors.
- p stands for plasmid, and BR for Blivar and Rodriguez.



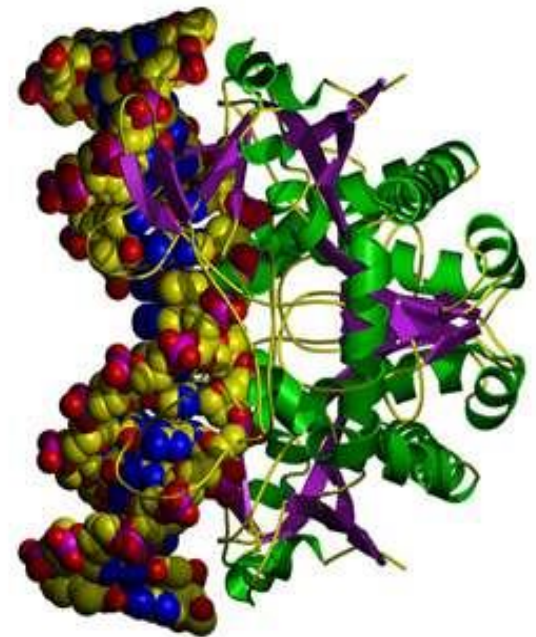


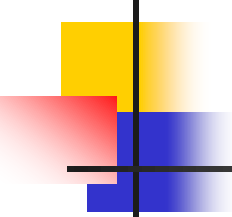
Gene transfer

- It is to transfer a gene from one DNA molecule to another DNA molecule.
- It represents a relatively new possibility for the treatment of rare genetic disorders by changing the expression of a person's genes.

Restriction Enzyme

- A **restriction enzyme** (or **restriction endonuclease**) is an enzyme that cuts double-stranded or single stranded DNA at specific recognition nucleotide sequences known as restriction sites

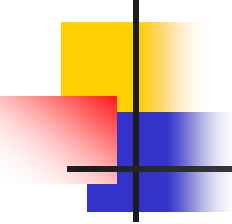




Why Bacteria?

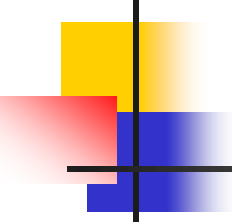
- ❖ Bacteria are cheap,
- ❖ easy to grow,
- ❖ clonal, multiply quickly,
- ❖ relatively easy to transform and
- ❖ can be stored at -80°C almost indefinitely.
- ❖ Once a gene is isolated it can be stored inside the bacteria providing an unlimited supply for research.

- By engineering genes into bacterial plasmids it is possible to create a biological factory that can produce proteins and enzymes.
- yeast, a eukaryote, can also be used.
- Bacteria and yeast factories have been used to produce medicines such as insulin, human growth hormone, and vaccines.



Basic steps in genetically Modifying an organisms

- Identification of DNA with desirable genes
- Introduction of the identified DNA into the host
- Maintenance of introduced DNA into the host and transfer of the DNA to its progeny.



Thanks for being so patient.

- Have a nice day.

