

**Modulo Interdisciplinare CLIL Titolo del Modulo:
Biotechnologies”**

Curato da : Prof. ssa Polì Domenica e Prof. ssa Barbara Belfiore

Obiettivi:

- 1) Conoscere le tecniche di ingegneria genetica e la loro applicazione nei vari campi di ricerca.
- 2) Conoscere l'utilità di virus e batteri per le applicazioni biotecnologiche.
- 3) Migliorare le competenze di "Biologia molecolare e di genetica."
- 4) Migliorare le competenze della lingua inglese.
- 5) Espandere il patrimonio lessicale in L1 ed L2.

Obiettivi Trasversali

- 1) Saper collaborare con i compagni e partecipare con interesse alle lezioni
- 2) Saper attivare strategie di apprendimento e apprendere da prospettive diverse
- 3) Saper riflettere su quanto svolto e individuare punti di forza e criticità
- 4) Saper attivare i processi cognitivi superiori: distinguere, confrontare, descrivere, sintetizzare, operare collegamenti.

Prerequisiti

Disciplinari	Linguistici
<ul style="list-style-type: none">• Conoscere la struttura e le funzioni degli acidi nucleici• Conoscere i meccanismi dell'espressione genica• Conoscere i cicli vitali di batteri e virus	<ul style="list-style-type: none">• Conoscere le principali strutture linguistiche di livello intermedio• Capire parole o espressioni scritte e orali inerenti al modulo• Enunciare in forma scritta e orale definizioni e proprietà• Eseguire correttamente istruzioni richieste

Competenze disciplinari

Conoscenze

- Le biotecnologie e le loro applicazioni.
- Ruolo degli enzimi di restrizione.
- Le principali tecniche dell'ingegneria genetica.
- Gli organismi geneticamente modificati.
- Le principali questioni bioetiche connesse alle applicazioni del DNA ricombinante.

Abilità

- Acquisire e utilizzare la corretta terminologia nell'ambito della biologia molecolare e dell'ingegneria genetica.
- Analizzare e comprendere dati e informazioni provenienti da articoli scientifici che trattano temi di attualità inerenti le biotecnologie e le loro applicazioni più recenti.
- Collegare le caratteristiche dei microrganismi utilizzati con le caratteristiche dei prodotti ottenuti.
- Comprendere e interpretare le implicazioni sociali ed economiche delle più recenti applicazioni biotecnologiche

Competenze linguistiche

- The first aim for the students is to be able to understand the linguistic function giving directions, understanding tasks which is used to introduce all the activities they have to carry out.

The expression used are concerned with:

- The imperative (complete, work out, find, explain, prove,...)
- To have to...
- The second purpose is to know and to be able to use the microlanguage used in their activities
- The third objective is to be able to produce the language used to express the rules necessary to work out the activities.

Metodologia

- Lezione dialogata
- Lezioni multimediali di ascolto e visione
- Cooperative Learning

L'attività è stata svolta con metodologia CLIL. Tale metodologia prevede un apprendimento fondamentalmente attivo, interazionale e cooperativo. Le fasi in cui è stato diviso il modulo sono le seguenti: Fase 1

INTRODUCTION

- a) attività motivazionale di warming up.
- b) attività di verifica dei prerequisiti disciplinari mediante Brainstorming
- c) attività di contestualizzazione disciplinare

Fase 2 READING AND LISTENING

In questa fase gli studenti hanno lavorato in piccoli gruppi secondo uno svolgimento cooperativo e socializzante

Fase 3 PRACTICE

In questa fase sono state proposte attività di consolidamento, rinforzo, approfondimento e verifica in cui gli alunni hanno adoperato le conoscenze e le abilità disciplinari e linguistiche obiettivo del modulo.

Il modulo completo è allegato al documento (allegato 5)



Biotechnologies

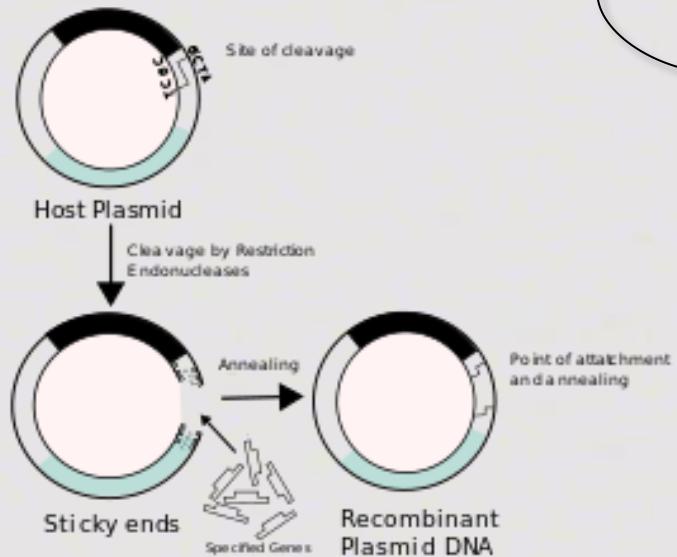
How is biotechnology changing our lives?

What are biotechnologies?



Biotechnologies are a group of different technologies that use living micro-organisms and viruses to create things that help men.

Let's think about bacteria that are used to create recombinant DNA.



What's recombinant DNA?

To create a recombinant DNA we need a DNA fragment from a donor. Once we have it, we insert the new DNA into a small DNA molecule called "the cloning vector". Every new cell that is created has his own capacity. Not all the cells are specialized, let's think about stem cells that can be extracted by the umbilical cord of babies.

How does DNA recombinant work?

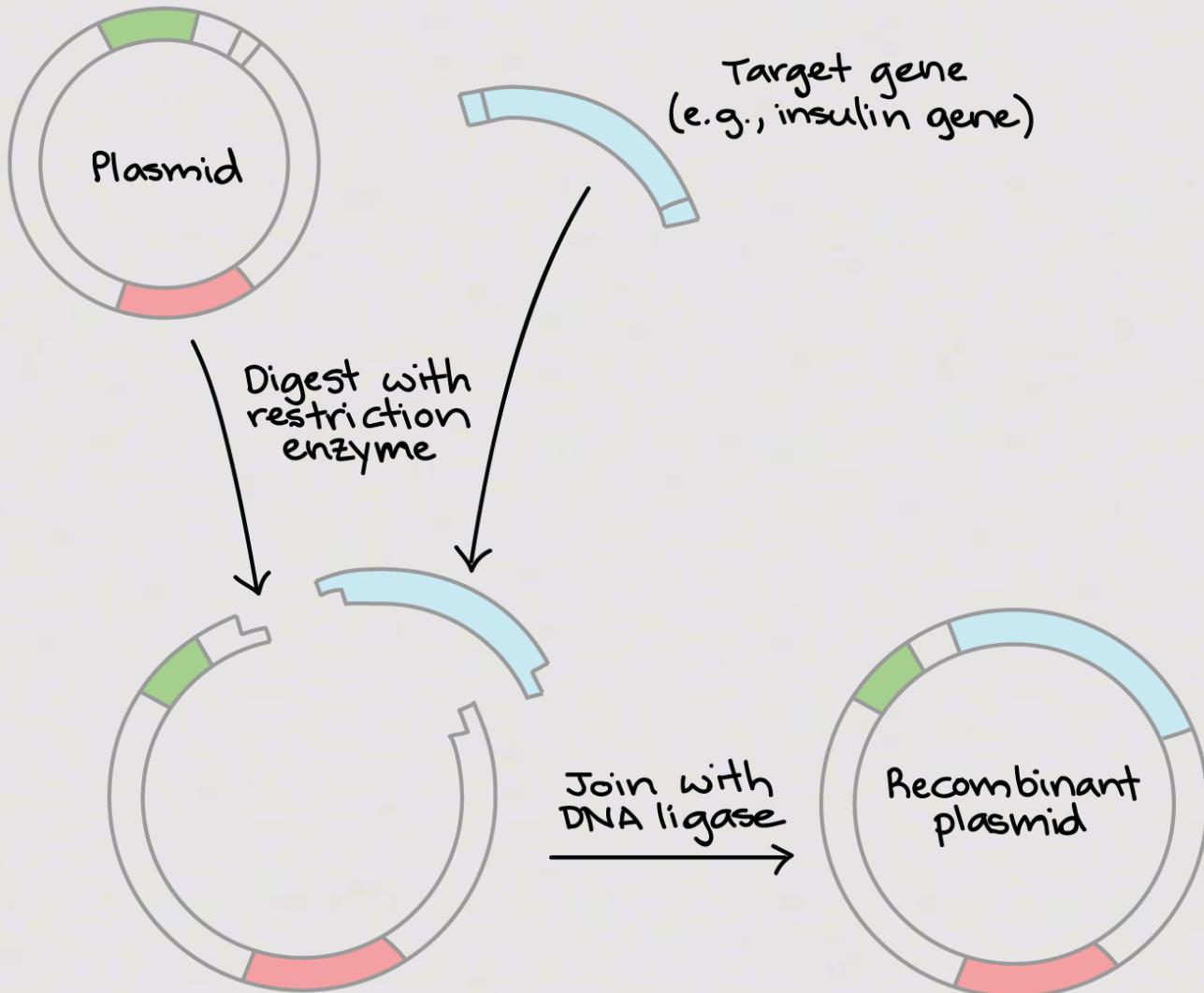


To explain it we have to think about 4 important steps:

- DNA of interest is isolated.
- Vectors, that are like scissors, cut the DNA in a very precise way. Vectors also have the capacity of insert it in the cell (bacteria, yeast).
- Once it is inserted we have to leave it there ad wait for a few hours.
- After some time we can see large quantities of cells that contains the DNA that we wanted to clone.



Let's see it!



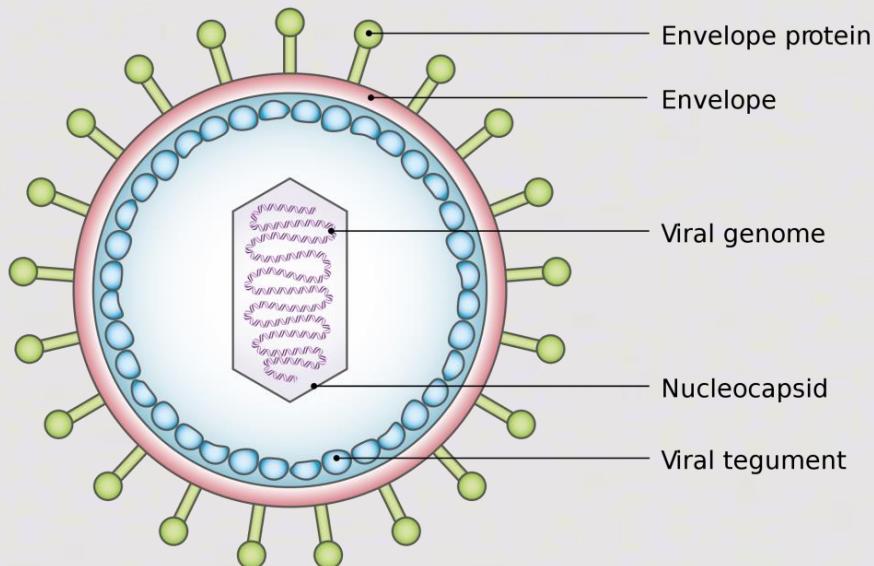
Viruses



Viruses are not considered living creatures but **microscopic particles**. Basically they are considered parasites because to replicate themselves they have to enter inside cells of: bacteria, animals or plants.

They have:

- an internal part made up of nucleic acid (DNA or RNA).
- an external part made up of a capsid with little spikes that allows the virus to attach himself to other cells.

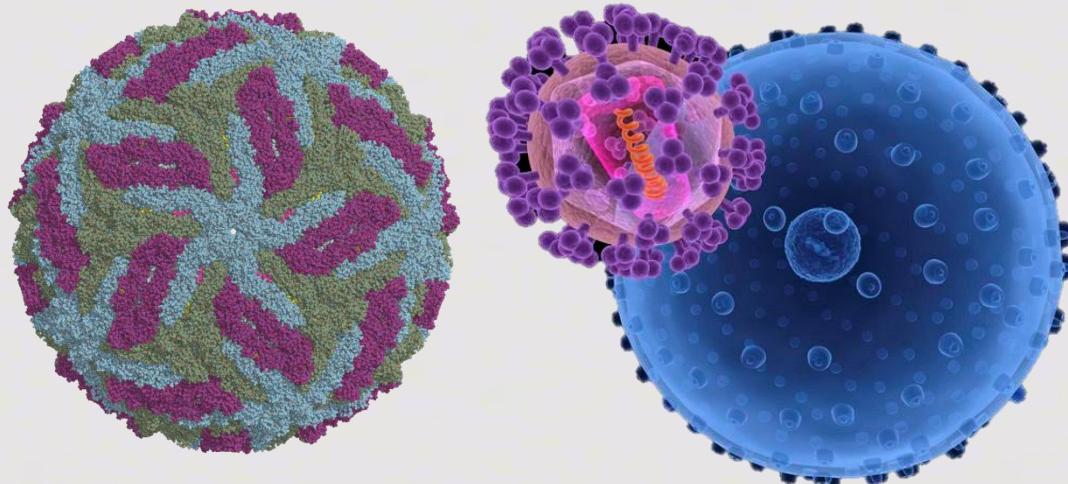


How do they replicate themselves?

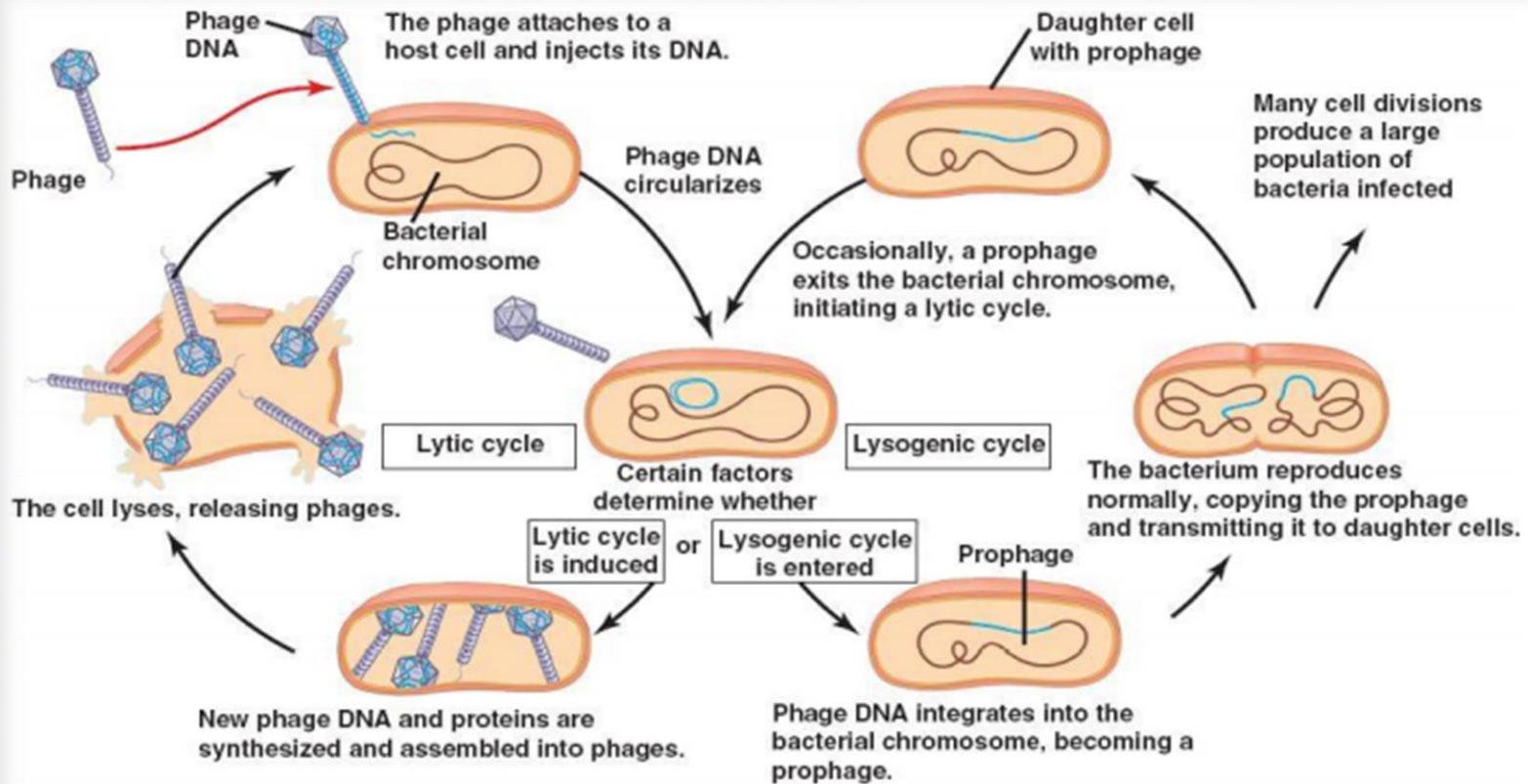


At first the virus, that contains the DNA inside the phage, insert his gene to the host cell. The DNA of the virus circularizes and at this point, due to certain factors, the cycle can be lytic or lysogenic.

Due to the fact that viruses inject their DNA into cells for their replication cycle, they can be used as **cloning vectors**. Basically they are seen like a sort of syringes.



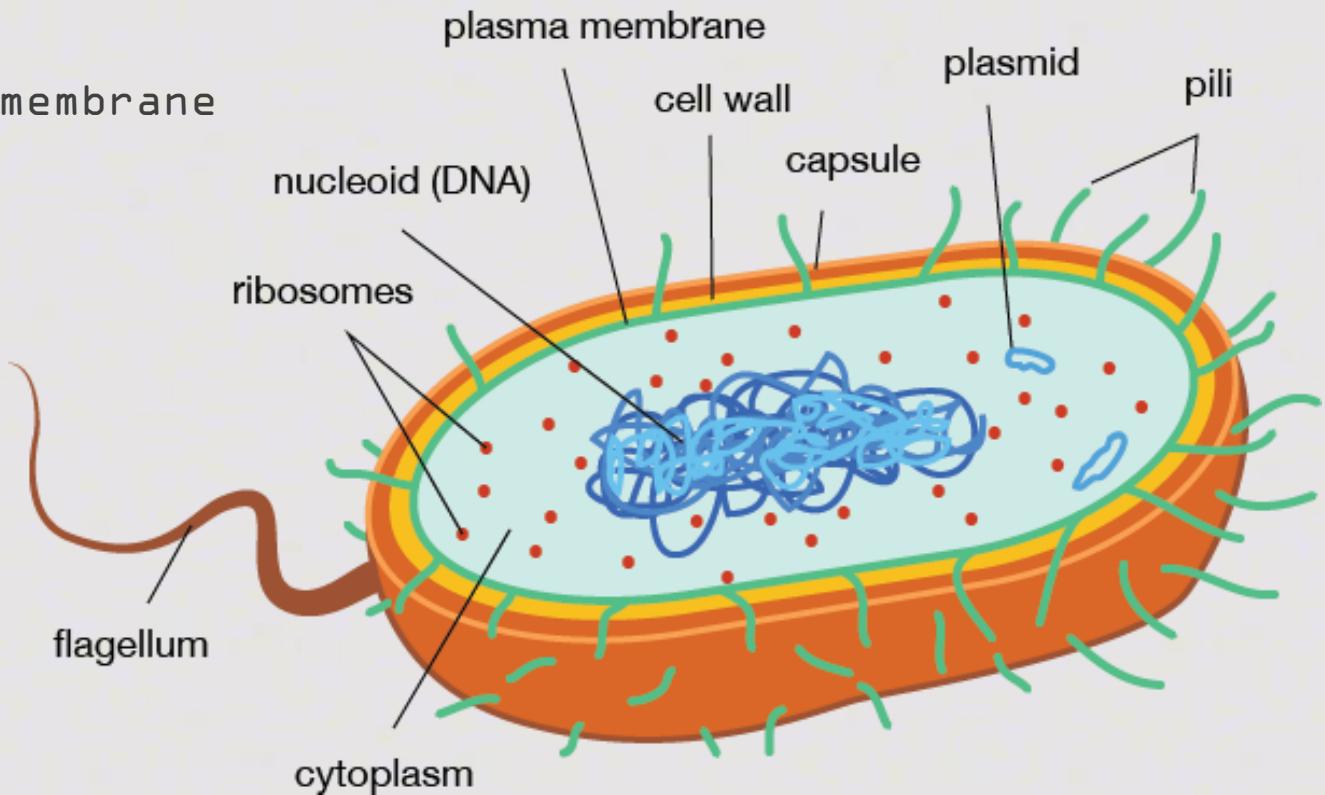
Procedure



Bacteria

Bacteria have a much more complexed structure than viruses.
They have:

- a flagellum
- pili
- a capsule
- a plasma membrane
- cytoplasm
- ribosomes
- a DNA

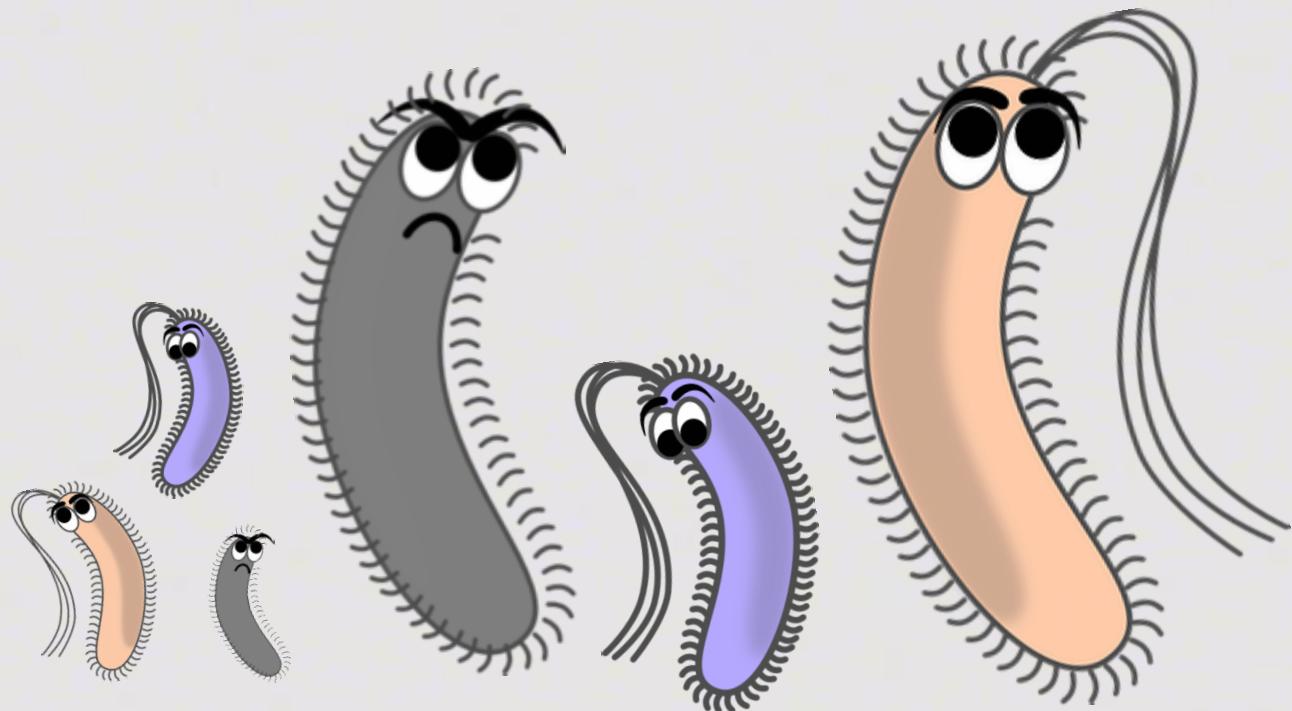


Bacteria



Bacteria are known for they capacity of replicate themselves for this reason the DNA that we want to copy is inserted inside the bacteria.

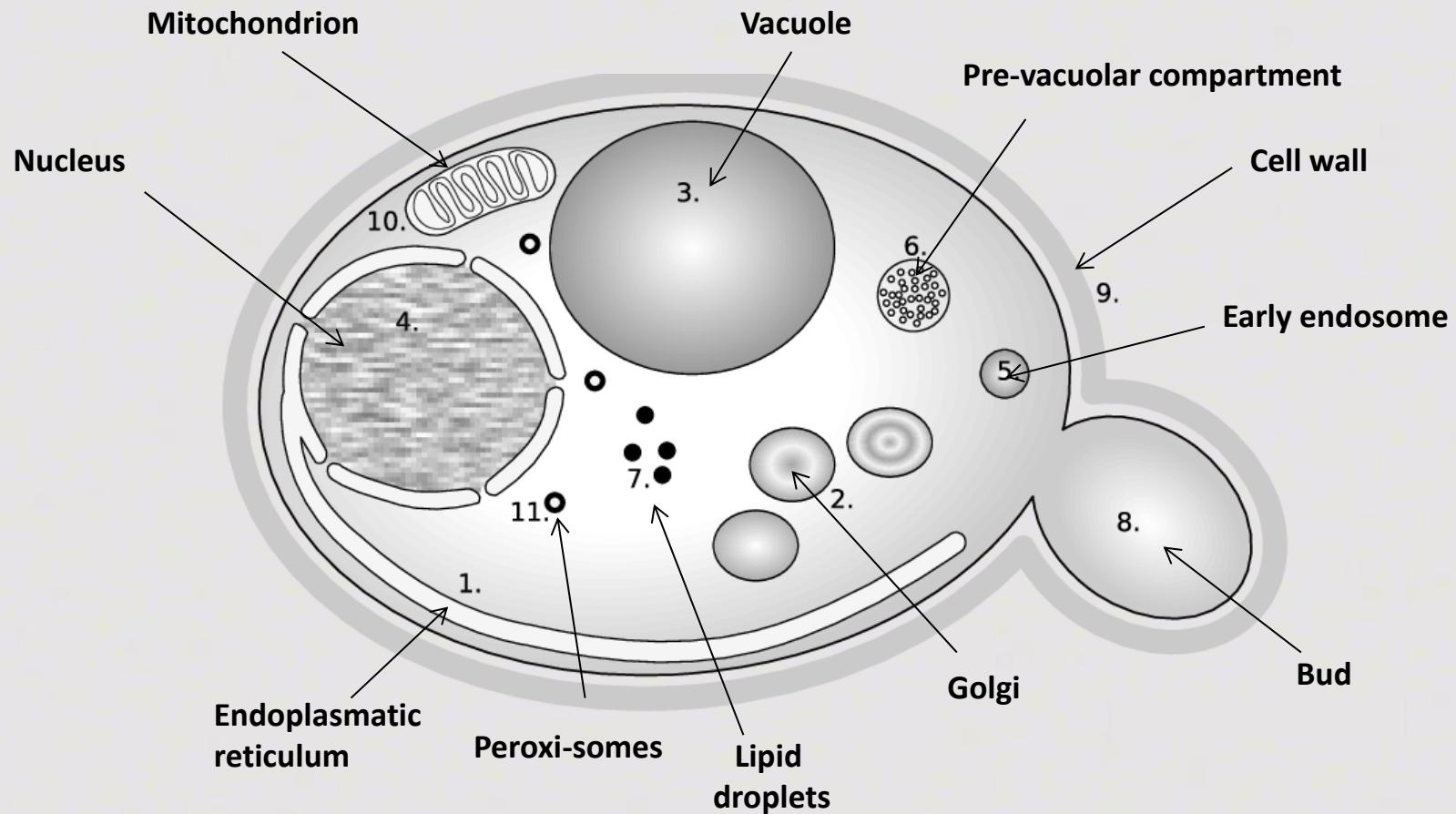
Bacteria are very important for biotechnology. Many antibiotics, insulin or human growth hormone use bacteria.



Yeast Cells



They are eukaryotic unicellular organism.



Yeast Cells and biotechnology



Since the early 1980s the yeast cells have been widely employed in genetics and molecular biology since they can be easily manipulated and cultured in the laboratory. The yeast cells are able to perform different eukaryote specific post-translational modifications, necessary for proteins to achieve a functional shape.

Yeasts are used in research as:

- protein factories;
- to express large quantities of eukaryotic proteins;
- for therapeutic applications;
- in research to determine their functional and regulatory properties.



Why biotechnologies use yeast cells?



Although bacteria are very useful in cloning, they are not suitable to express eukaryotic genes.

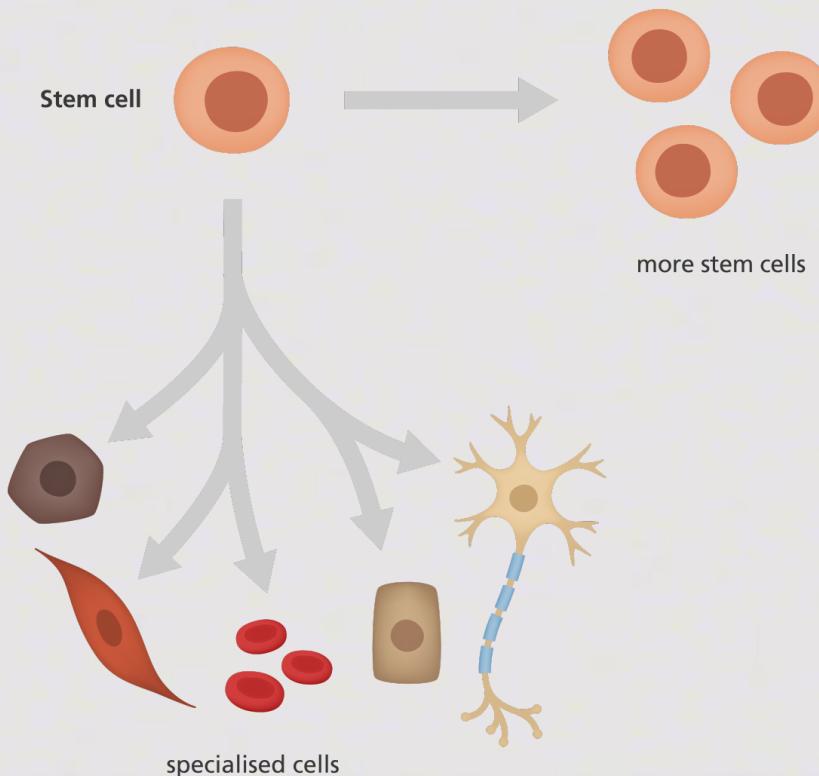
The Problem has been solved using yeast cells, which are able to perform different eukaryote- specific post - translation modifications necessary for proteins to achieve a functional shape.

basic lives
early biology
discovery
recombinant
increase
genetics
techniques
prominent
expanded
advances
sciences
field
alleviation
Laboratory
institutions
developing
world
biotech
since
Biotechnology
molecular
pharmaceuticals
findings
industry
new
agricultural
technologies
emerging
improving
creating
scientists
goal
regular
dramatically
maintained
greatly
crop
pain
links
DNA

Stem cells



They are undifferentiated cells, having the remarkable potential to develop into different specialized cell types in the body. Stem cells are found in adult tissues and organs, such as bone marrow, muscle and skin.



What do they do?



These cells have the remarkable role of replacing worn out or damaged cells, or act as a repair system, dividing without limits, and replacing the old cells with the new ones, to regenerate the damaged tissue.

Researchers use human stem cells in various ways:

- To study the cellular differentiation;
- To create tissues that could be used in therapy;
- To test new drugs.

They're really special!

