BIOTECHNOLOGY
Dr.Sarween.O.Taha
Ph.D. in Molecular Microbiology
Lecture: 1

WHAT IS BIOTECHNOLOGY

Biotechnology uses living cells to develop or manipulate products for specific purposes, such as genetically modified foods. Biotechnology is thus linked to genetic engineering and emerged as a field in its own right at the beginning of the 20th century in the food industry, which was later joined by other sectors such as medicine and the environment.

Today, the five branches into which modern biotechnology is divided — human, environmental, industrial, animal and plant .

The evolution of biotechnology

Year 2020

Biotechnology innovations lead the fight against the SARS-CoV-2 pandemic.

Year 2013

The first bionic eye is produced in the US giving hope to blind people worldwide.

Year 2010

A group of researchers from the J.Craig Ventere Institute creates the first synthetic cell.

Year 1998

A draft of the human genome map is created that locates more than 30,000 genes.

Year 1997

Scientists introduce the world to Dolly the sheep, the first clone of a mammal.

Year 1983

The first genetically modified (transgenic) plant is presented.

Year 1969

An enzyme is synthesized in vitro for the first time in history.

Year 1953

Biologists James Watson and Francis Crick describe the double helix of DNA.

Year 1943

Canadian scientist Oswald Theordore Avery discovers that DNA is the carrier of genes.

Year 1928

Scottish bacteriologist Alexander Fleming discovers the antibiotic use of penicillin.

Year 1919

Hungarian agronomist Karl Ereky coins the term biotechnology.

USES AND APPLICATIONS OF BIOTECHNOLOGY

Biotechnological innovations are already part of our daily lives and we find them in pharmacies and supermarkets, among many other places. In addition, in recent months biotechnology has become one of the spearheads in the fight against the COVID-19 global pandemic, since it helps to decipher the virus' genome and understand how the our body's defence mechanism works against infectious agents.

Biotechnology will therefore play a crucial role in the society of the future in preventing and containing potential pathogens. But this is just one of its many applications... Below, we review some of the most relevant in different fields:

Medicine

The development of insulin, the growth hormone, molecular identity and diagnostics, gene therapies and vaccines such as hepatitis B are some of the milestones of biotechnology and its alliance with genetic engineering.

Industry

The revolution of the new smart materials hand-in-hand with biotechnology has only just begun. Soon we could have self-healing concrete, plants that change colour when they detect an explosive, clothing and footwear made with synthetic spider web, etc.

Food

In addition to the genetically modified foods mentioned above, thanks to biotechnology products such as WEMA have been created, a type of crop resistant to droughts and certain insects that may prove essential in fighting hunger in Africa.

Environment

Through bioremediation processes, very useful for ecological recovery, the catabolic properties of microorganisms, fungi, plants and enzymes are used to restore contaminated ecosystems.

What is DNA technology?

Many examples of modern biotechnology depend on the ability to analyze, manipulate, and cut and paste pieces of DNA. Approaches for the sequencing and manipulation of DNA are sometimes referred to as DNA technology. For example, for the cystic fibrosis gene therapy trial, researchers used DNA manipulation techniques to insert the chloride channel gene into a piece of carrier DNA (a vector) that allowed it to be expressed in human lung cells.

DNA technology is important to both basic and applied (practical) biology. For instance, a technique used to make many copies of a DNA sequence, called polymerase chain reaction (PCR), is used in many medical diagnostic tests and forensics applications as well as in basic laboratory research.