

# Read About Biotechnology

## WHAT IS BIOTECHNOLOGY?

Biotechnology is when humans use their knowledge of biological processes to solve problems. One example is using DNA to solve a murder. Another example is improving plants to make them resistant to drought or allow plants to make vitamins that people in developing countries need. As with any new technology, with great power comes great responsibility.

*To better understand biotechnology...*

## LET'S BREAK IT DOWN!

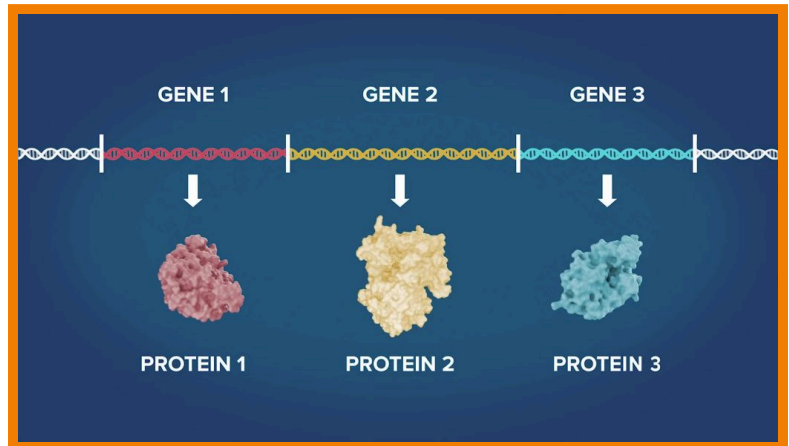
### Artificial Selection

Artificial Selection is the process in which humans decide what traits they want an organism to have. Humans artificially select for traits in both plants and animals for many different reasons, which may include designing a specific kind of sheep that makes fluffy wool, or making plants that contain extra vitamins.



## DNA and Genes

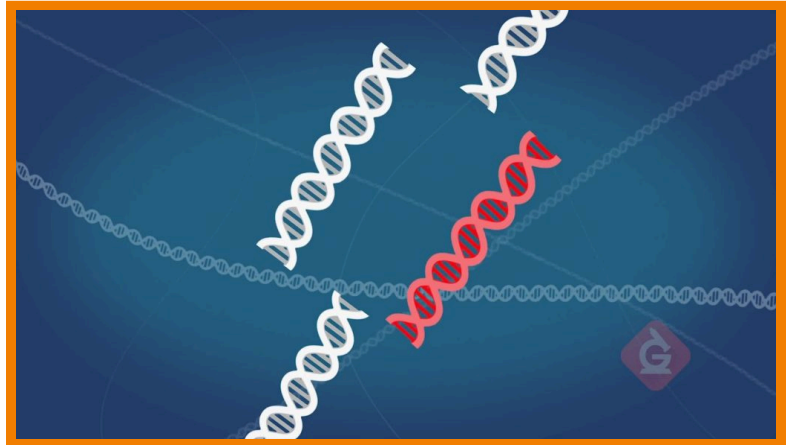
DNA is short for deoxyribonucleic acid and is the genetic material found in the cells of all living organisms. Genes are specific sections of DNA that hold the code for certain traits.



---

## Gene Therapy

Gene Therapy is a relatively new medical treatment that can be used to treat certain disorders and diseases. Gene therapy can be done through adding genes or replacing genes. Either way, the goal is for the body to make more healthy cells in place of the ones that have been damaged.



---

## Diabetes and Insulin

Diabetes encompasses a variety of disorders that affect an animal's ability to produce insulin, the chemical that helps control blood sugar levels in the body. Insulin used to be harvested from the pancreas of cows and pigs for human use, but is now synthesized in high quantities using a biologically enhanced



bacterium.

---

## Careers in Science: Molecular Biologist

A molecular biologist is a scientist that studies things at the cellular and molecular level to figure out cellular processes. Molecular biologists can work in many different areas including; medical research, agricultural research, biomedical technology, and genetics.



### BIOTECHNOLOGY VOCABULARY

#### Biotechnology

When humans use natural biological processes to solve a human problem.

---

#### Artificial selection

A process when humans choose specific traits they want and breed organisms together for those specific traits.

---

#### Trait

A characteristic belonging to a population or organism. Humans can manipulate traits through artificial selection.

---

#### Gene

Part of a chromosome that is inherited from the parent(s) and determine some of an organism's characteristics.

---

#### Diabetes

Is a group of diseases that causes too much sugar in the bloodstream. Diabetes can usually be controlled by insulin.

---

#### Bacteria

Microscopic, single cell organism that can be found in diverse environments. They can be used to make insulin to treat people with diabetes.

---

### BIOTECHNOLOGY DISCUSSION QUESTIONS

## **How can biotechnology be used to develop medical treatments and give an example?**

Scientists used bacteria and added just one extra gene to it to develop insulin to treat people with diabetes.

---

## **What is the relationship between genes and DNA?**

DNA is the genetic material that is found in the cells of living things, genes are specific pieces of DNA that give living things their traits.

---

## **Explain how an offspring gets its genes?**

In sexual reproduction, which includes most plants and animals, offspring get their genes from their parents. They get half from mom and half from dad.

---

## **What is one way artificial selection can be used to change another organism?**

Artificial selection is used to make something look or taste a specific way. One way we use artificial selection is to make animals, like sheep, the way we want.

---

## **Explain how artificial selection could lead to a change (evolution) of a whole population.**

Plants can be bred for different traits that can eventually lead to a new kind of food. For example kale, cabbage, cauliflower, broccoli, and Brussels sprouts all used to be the same plant, and now they have evolved to be all different plants.

---

## **Explain how laundry detergent can be a product of biotechnology.**

Some laundry soaps contain special enzymes. Those enzymes are a protein that we find in many plants and animals. Some enzymes are really good at breaking down stains, so scientists have figured out a way to add them to laundry soap to make it more effective.

---