

Genetically Modified Organisms

What are Genetically Modified Organisms?



Genetically modified organisms have been artificially changed.

Genetically modified organisms, or **GMOs**, are organisms such as plants or animals whose DNA has been artificially changed. This type of genetic manipulation allows for very precise introduction of genetic traits rather than the wholesale transfer of genetic material that occurs when one simply breeds two animals or cross pollinates two plants to produce a desired trait. With traditional breeding, that target characteristic may come with some unintended and potentially harmful traits. There are many benefits to GMOs but there are also a lot of concerns as well.

History of Genetically Modified Organisms

The idea behind genetic modification is an ancient one. Our ancestors engaged in what is known as **selective breeding** by choosing specific animals to mate in order to produce offspring with desired characteristics. In this way, wolves gave rise to domesticated dogs, and more muscular - and thus higher meat-producing - cattle were developed. Similar selection was carried out on plants, resulting in larger ears of corn and sweeter apples, among other advancements.



Modern dogs are the result of thousands of years of selective breeding.



The first GMO was a bacterium given antibiotic resistance in 1973.

Modern genetic engineering performed in a laboratory began in 1973, when Herbert Boyer and Stanley Cohen successfully inserted a gene from one bacterium into another, thus transferring the donating bacterium's antibiotic resistance. The first GMO animal, a mouse, was produced in 1974. Since its origins, GMO technology has expanded to include the production of medicines, the creation of bacteria for cleaning oil spills, and the alteration of plants for agricultural reasons. This last category is the most widely known and most controversial class of GMO.

How Are Organisms Genetically Modified?

There are several ways to insert genetic material from one organism into another. These include the gene gun, *Agrobacterium tumefaciens*, microfibers, and electroporation.

Reading Sample



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also hardier and able to grow in less ideal conditions, such as soil heavy in aluminum and boron or during periods of drought.

Animals that have been genetically engineered have also contributed to the food supply such as salmon that grow faster and larger and cows that are resistant to mad cow disease.

Genetically modified organisms are also widely used for medical research. Human genes are inserted into animals to study how genetic diseases progress and to test therapies. Through a process called **xenotransplantation**, GMO animals can be used to grow tissues and organs for transplant to humans. Bacteria can also be used for medical purposes such as making insulin and thyroid hormones.

Concerns About Genetically Modified Organisms

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GMOs also have the potential to impact the environment into which they are planted. Traits that have been selected for in crop species to make them more immune to drought and resistant to pesticides could be passed on to unwanted species in the same area. This is, however, only true of species that are already genetically similar to each other. Growers of GM foods are restricted in where they can plant in relation to wild or organic varieties. The growth and development of genetically modified organisms is and should continue to be closely monitored and regulated. Scientists have concluded, however, that GMOs are as safe for human consumption as conventional crops.

Reading Comprehension Questions

1. What
2. Who produced the first GMO and when?
3. What
4. What four methods of gene transfer were discussed?
5. What
6. What
7. Name three benefits of GMOs.
8. What is xenotransplantation?
9. Name

Extension Questions

10. Some people object to genetically modified organisms for moral reasons. With a little research, explain what those objections are and if you agree with them.
11. The

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