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A Short Note on Genetic Engineering

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Description

Genetic engineering, also known as genetic modification or genetic manipulation, is the use of biotechnology to directly manipulate an organism's genes. It is a set of technologies used to alter the genetic makeup of cells, including gene transfer within and across species boundaries, in order to create better or novel organisms. The genetic material of interest is isolated and copied using recombinant DNA methods or the DNA is synthesised artificially. Typically, a construct is created and used to insert this DNA into the host organism. Paul Berg created the first recombinant DNA molecule in 1972 by combining DNA from the monkey virus SV40 with DNA from the lambda virus. In addition to inserting genes, the process can be used to delete, or "knock out," genes. The new DNA can be inserted at random or specifically to a specific region of the genome.

A Genetically Modified (GM) organism is one that is created through genetic engineering, and the resulting entity is a Genetically Modified Organism (GMO). Herbert Boyer and Stanley Cohen created the first GMO in 1973 with a bacterium. In 1974, Rudolf Jaenisch created the first GM animal by inserting foreign DNA into a mouse. Genentech, the first company to focus on genetic engineering, was founded in 1976 and began producing human proteins. Human insulin was genetically engineered in 1978, and insulin-producing bacteria were commercialised in 1982. Since the release of the Flavr Savr tomato in 1994, genetically modified food has been available for purchase. The Flavr Savr was designed to have a longer shelf life, but most current GM crops are modified to increase insect and herbicide resistance. GloFish, the first GMO created for use as a pet, was introduced in the United States in December 2003. Salmon that had been genetically modified with a growth hormone were sold in 2016 [1,2].

Genetic engineering has been used in a wide range of applications, including research, medicine, industrial biotechnology, and agriculture. GMOs are used in research to study gene function and expression *via* loss of function, gain of function, tracking, and expression experiments. It is possible to create animal model organisms of human diseases by knocking out genes responsible for specific conditions. Genetic engineering has the potential to cure genetic diseases through gene therapy, in addition to producing hormones, vaccines, and other drugs. The same techniques used to manufacture drugs can also be used to manufacture enzymes for laundry detergent, cheese, and other products. It resulted in the adoption of an international treaty, the Cartagena Protocol on Biosafety, in 2000. Individual countries have developed their own GMO regulatory systems, with the most notable differences occurring between the United States and Europe [3-5]

Conclusion

Genetic engineering is the process of modifying an organism's genetic structure by removing or inserting DNA. Unlike traditional animal and plant breeding, which involves performing multiple crosses and then selecting for the organism with the desired phenotype, genetic engineering transfers the gene directly from one organism to another. This is much faster, can be used to insert any gene from any organism (even those from different domains), and prevents the addition of other undesirable genes. By replacing the defective gene with a functional one, genetic engineering could potentially cure severe genetic disorders in humans. It is a valuable research tool for studying the function of specific genes. Drugs, vaccines, and other products have been harvested from organisms engineered to produce them. Crops that increase yield, nutritional value, and tolerance to environmental stresses have been developed to help with food security.

Conflict of Interest

None.

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