Genetic modifications

Although we consider genetic modification to be one of the most technologically demanding disciplines, it has its foundation in the ancient past. Selective breeding was used by our ancestors and it is even possible to find mention of it in the Bible. However, this technique has many limitations, sometimes it takes centuries for the desired character to appear and the results are quite uncertain. New methods are much more effective. A simplified version is the insertion of so-called plasmids (circular DNA chains) into a bacterial cell, the bacterium then begins to produce the desired substance. The next stage is the insertion of new genes into the genome plants and animals.

[[File:Genetic modification of Influenza A virus.jpg|thumb|250px|right|An example of genetic modification of the influenza A virus]

Selective crossing

In nature, only the most adaptable and strongest organisms survived, but they were not always the ones that man needed. So people chose those organisms that carried the necessary traits. An example would be grain. There are species that have a high grain yield, and species that are very resistant to climate. By crossing these species, we get a very resistant plant, which at the same time feeds a larger population. The same can be done with animals, but due to the longer generation time, this process is more demanding. Selective crossing is a very simple and effective method, but the disadvantage is that it is relatively time-consuming and the result uncertain.

Insertion of plasmids

Plasmids are part of the genome of most bacteria, it is a circular section of DNA encoding some protein not important for the function of the bacterium as such, but can help it survive in adverse conditions. In nature, plasmids often carry genes responsible for resistance to antibiotics. Genetic engineering methods allow us to create recombinant plasmids that carry the desired genes. To insert the plasmid into the bacterium, we must overcome its cell wall (this is achieved with $CaCl_2$ and subsequent cooling) and the membrane (a "heat shock" is used to open the membrane). Plasmids then easily get inside. The bacterium is then able to produce the chosen protein.This is how some human hormones, especially insulin.

Gene insertion

In essence, this process is very similar to insertion of plasmids, with the difference that higher organisms have a nucleusand it is not enough to just insert the plasmid into the cytoplasm, but the genetic information must be incorporated into the nuclear DNA. The preparation of recombinant DNA proceeds in the same way as for a plasmid, but it is not enclosed in a circular sequence. For the implantation of the gene, it is necessary to use some kind of vector. You can use the services of a specially modified virus, the so-called ,,Gene Gun, or electric current. Several plants have already been modified in this way. Examples include frost-resistant strawberries or Bt corn, which produces an insecticidal toxin.

Links

Relates articles

- Genetic manipulation and genetic engineering
- Genetically modified organisms
- Genetically modified foods
- Biochemistry of genetic engineering

References

- DAUGHERTY, Ellyn. *Biotechnology : Science for the New Millennium.* 1. edition. 2006. ISBN 978-0-76382-282-8.