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ACHIEVEMENTS OF MODERN BIOTECHNOLOGY

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Biotechnology, as a science, has established itself at the end of the twentieth century, namely in the early 70s. It all started with genetic engineering, when scientists were able to transfer genetic material from one organism to another without the implementation of sexual processes. For this, recombinant DNA or rDNA was used. This method is used to change or improve a particular organism.

Medical biotechnology is divided into 2 large groups:

1. Diagnostic, which, in turn, are: chemical (determination of diagnostic substances and metabolic parameters); physical (determination of the physical fields of the body);
2. Medicinal.

Medical biotechnology includes such production processes in the course of which biological objects or medical substances are created. These are enzymes, vitamins, antibiotics, individual microbial polysaccharides, which can be used as independent agents or as auxiliary substances in the creation of various dosage forms, amino acids [2]

Biotechnology in modern science

Biotechnology in modern science is of immense benefit. Due to the discovery of genetic engineering, it became possible to develop new varieties of plants and animal breeds that will benefit agriculture.

The study of biotechnology is associated not only with the sciences of the biological direction. In microelectronics, field effect ion-selective transistors (HpaI) have been developed.

Biotechnology is essential to enhance oil recovery from oil reservoirs. The most developed area is the use of biotechnology in ecology for the treatment of industrial and domestic wastewater [2]

Many other disciplines have contributed to the development of biotechnology, which is why biotechnology should be classified as a complex science.

Another reason for the active study and improvement of knowledge in biotechnology was the issue of the lack (or future deficit) of socio-economic needs.

There are such problems in the world as:

1. lack of fresh or treated water (in some countries);
2. pollution of the environment with various chemicals;

3. shortage of energy resources;
4. the need to improve and obtain completely new environmentally friendly materials and products;
5. raising the level of medicine.

Scientists are confident that it is possible to solve these and many other problems with the help of biotechnology.

Basic typical technological methods of modern biotechnology

Biotechnology can be distinguished not only as a science, but also as a sphere of human practical activity, which is responsible for the production of various types of products with the participation of living organisms or their cells.

The theoretical basis for biotechnology once became such a science as genetics, this happened in the twentieth century. But practically biotechnology was based on the microbiological industry.

The microbiological industry, in turn, received a strong impetus in development after the discovery and active production of antibiotics.

The objects with which biotechnology works are viruses, bacteria, various representatives of flora and fauna, fungi, as well as organelles and isolated cells.

Visual biotechnology. Genetic and cell engineering

Genetic and cellular engineering combined with biochemistry are the main areas of modern biotechnology[3].

Cellular engineering - growing in special conditions cells of various living organisms (plants, animals, bacteria), various kinds of research on them (combination, extraction or transplantation).

The most successful is plant cell engineering. With the help of plant cell engineering, it became possible to accelerate breeding processes, which makes it possible to develop new varieties of agricultural crops. Now the breeding of a new variety has been reduced from 11 years to 3-4 years.

Genetic engineering is a department of molecular biology in which they study and isolate genes from the cells of living organisms, after which they are manipulated to achieve a specific goal. The main tools used in genetic engineering are enzymes and vectors.

Genetic engineering is an artificial change in the genotype of a microorganism, caused by human intervention, in order to obtain crops with the required qualities.

It is engaged in research and study of not only microorganisms, but also humans, actively studies diseases associated with the immune system and oncology.

Biotechnology cloning

Cloning is the process of obtaining clones (that is, descendants that are completely identical to the prototype). The first cloning experiment was carried out on plants that were cloned vegetatively. Each individual plant that resulted from cloning was called a clone.

In the course of the development of genetics, this term began to be applied not only to plants, but also to the genetic breeding of bacteria.

Already at the end of the twentieth century, scientists began to actively discuss human cloning. Thus, the term "clone" began to be used in the media, and later in literature and art.

As for bacteria, cloning is practically the only way to reproduce. It is the "cloning of bacteria" that is used when the process is artificial and controlled by a person. This term does not apply to the natural reproduction of microorganisms.[1]

Biotechnology in the modern world and human life

The potential that biotechnology opens up for humans is great not only in fundamental science, but also in other spheres of activity and fields of knowledge. With the use of biotechnological methods, it became possible to mass produce all the necessary proteins.

Processes for obtaining fermentation products have become much simpler. In the future, biotechnology will improve animals and plants. Scientists are considering options for combating hereditary diseases using genetic engineering.

Genetic engineering, as the main direction in biotechnology, significantly accelerates the solution of the problem of food, agricultural, energy and environmental crises [4].

Biotechnology has the greatest impact on medicine and pharmaceuticals. It is predicted that in the future it will be possible to diagnose and treat those diseases that have the status of "incurable".

Modern achievements and problems of biotechnology

With the help of biotechnology, a huge number of products for healthcare, agriculture, food and chemical industries have been and will be obtained. It is worth mentioning that many of the products could not have been obtained in any other way.

As for the problems, so basically - these are ethical aspects associated with the fact that society denies and considers negative the cloning of a person or a human embryo.

Current state and prospects of biotechnology

In biotechnology, the branch of microbial synthesis of substances valuable for humanity began to develop actively. This may entail a shift in the distribution of the role of the food base, based on plants and animals, towards microbial synthesis.

Obtaining clean energy using biotechnology is another important and promising direction in science.

Companies developing new biotechnology

Forbes magazine presented a list of the world's most innovative biotechnology companies, which included such companies as: Genentech, Novartis International AG, Merck & Co, Pfizer, Sanofi, Perrigo. All these companies are directly related to pharmaceuticals and are developing in this direction.

Many of the companies are successfully taking an active part in the development of the Russian biotechnology market:

1. **"Novartis International AG"** - the company is engaged in the development of vaccines and the production of drugs in the field of oncology, one of the enterprises operates in St. Petersburg.

2. **Pfizer** - manufactures over-the-counter drugs in various fields of medicine. For several years now, Pfizer has been implementing the "More than Education" program in Russia under agreements with Moscow State University. M.V. Lomonosov and the St. Petersburg State Chemical and Pharmaceutical Academy.

1. **"Sanofi"** - the company is engaged in the production of drugs for the treatment of diabetes and sclerosis. A unique enterprise of the company is successfully operating in Russia - a full-cycle insulin production plant Sanofi-Aventis Vostok. [4]

What explains the rapid development of biotechnology?

Modern biotechnology will play a big role in the qualitative improvement of human life, the development of economic growth in countries. Through biotechnology, new means for diagnostics, vaccines, food, medicines are obtained.

Biotechnology helps in increasing the yield of all cereals, which is more than relevant given the growing population of our planet.

In some countries where significant amounts of biomass are not fully utilized, biotechnology will convert them into valuable products or biofuels for the foreseeable future. Biotechnology is increasingly ceasing to be an applied science, it is actively entering the ordinary life of people, helping to solve the pressing problems of modern mankind.

Biotechnology development until 2020

2. Prospects for biotechnology for the near future can be divided into advertising and science-based. The widely advertised projects include, for example, "pills of youth" - they are promised to be released on the market in time for 2020. However, skeptics say that there have been many such sensations since the days of alchemy. [5]

A 3D printer looks more realistic, applying cell cultures to a matrix with a nutrient solution, and forming artificial organs. Another medical project is the treatment of severe burns by applying stem cells to the affected area, which will form new skin in a matter of days.

Genetic repair is an area that is and will continue to develop, and a lot of money is invested in it.

Many microorganisms - bacteria, yeast, viruses - are used as recipients of foreign genetic material in order to obtain recombinant strains - producers of biotechnological products. This is how recombinant E. coli strains producing interferons, insulin, growth hormones, and various antigens were obtained; strains of B. subtilis that produce interferon; yeast producing interleukins, hepatitis B virus antigens; recombinant vaccinia viruses that synthesize antigens of the hepatitis B virus, tick-borne encephalitis virus, etc.

Thus, biotechnology opens up great prospects for humanity. At the same time, it should be remembered that experiments in this area can be dangerous, since organisms with unpredictable properties can arise during gene transfer. That is why work in the field of biotechnology must be carried out and carried out in accordance with strict international regulations. [5]

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