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GENETIC ENGINEERING

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ABSTRACT
Biotechnology means use of living organisms in order to create new products. Two main accomplishments of the biotechnology are genetic engineering and cloning. One of the main problems that appear applying genetic engineering in the process of biotechnology is to protect society from the damage caused by that in the environment.
Key words: man, organism, biotechnology, environment**.**

1. INTRODUCTION
Two major achievements of modern biotechnology are genetic engineering and cloning. Recent experience with transgenic plants indicates that their breeding can produce a large quantity of quality food, with lower production costs and greater environmental exemption. So far there is virtually no scientific elaborated case that can with arguments point to adverse effects of transgenic plants on the man or his environment. At the same time there is a number of dilemmas related to transgenic plants, whose resolution requires further studies and scientific approach.
Cloning allows reproduction without fertilization with those of higher animals (including humans) that normally breed only generative. This technique opens up great prospects in its application in diagnostic and therapeutic purposes.

2. GENETIC ENGINEERING
Genetic engineering is based on the notion that basic principles and mechanisms of species on Earth (structure, replication, translation and transcription of DNA, synthesis and function of proteins) are identical. That ist the basis of ideas and techniques of recombinant DNA, ie. planning "crop gene (trasgena) for some property from one living organism and its" transplant "(transformation) in the second one. In this way genetically modified organisms (GMOs), ie. transgenic plants, animals or micro-organisms can be created, whose genome is "enriched" transgenic, making them more useful to man. For agronomic practices are essential grown transgenic plants, which had a mass expansion in a very short time for commercial production (James, 2001). The most famous examples of first generation of transgenic plants are those with the transgenus from bacteria Bacillus thyringiensis, which gives capacity for transgenic plants (corn, cotton, potatoes...) to effectively synthese toxins against pests (Alstad and Andow, 1995) or transgenes from different soil bacteries, which provide selectivity of transgenic plant to different herbicides (Duke, 1996). Second generation of transgenic plants include examples of advanced product quality (changed the composition of fats, vitamins enrichment, etc.) or "molecular farming/agriculture" (production of vaccines and other molecules through transgenic plants).

3. CLONING

Living organisms grow and develop through the process of division and increasing in volume of body cells. One of the basic characteristics of living creatures that maintains the continuity of life and after death of individual organism is reproduction ability. Sexless, or vegetative propagation is based on the same processes as growth and development, ie. offspring inherits the unchanged genetic information of parents.

For sexual reproduction are required male and female sex cells that in the process of fertilization merge, forming the basis of hereditary offspring, which is a combination of hereditary basis of parents. For higher animals and humans it is characterized by the sexual reproduction and absence of vegetative reproduction. Body cells of higher animals and humans in the process of differentiation lose their ability to repeat cell regeneration of the individual and alsp in early stages of embryonic development, and therefore the ability of vegetative propagation. Cloning as a contemporary biotechnological method applies in order to provide offspring with the same genetic constitution like parents who cannot reproduce vegetatively. Usually those are previously genetically modified animals which need to be breeded in sufficient number, as genetically identical "copies". The most famous example of such cloning is the sheep Dolly. There are data on successful cloning of different species (eg, mouse, cat). Cloning is, apparently, successfully applied in humans.

4. ETICS

The term ethics refers to a set of unwritten understandings and attitudes about what is really good (right) and wrong (incorrect). In its evolutionary development, ethical attitudes and perceptions over time grew into a written legislation.

Survival of the species is achieved at the expense of individual struggles for survival. Unlike animals, human populations operates on the basis of common interest, which is above the individual. Looking at the history of civilization, common interest is initially manifested by the common struggle for food or territory of a pack homonids against each other. Over the past several thousand years ago there was a gradual merging of small pack and the formation of a unique human megapopulation. It would be logical to expect that the formation of megapopulation follows the unification of the moral and ethical standards. The reality is however, different. There are countless communities in megapopulation with their own interests, and consequently their moral and ethical standards. Some of interests of these communities are consistent with those of other communities, and some are different. In this situation it is not possible to define unique human ethical and moral standards at the level of megapopulation, but one phenomenon must be observed from different aspects. Ethical aspects of cloning and transgenic plants are an illustrative example of the existence of a very different, often totally opposite approach.

Proponents of genetic engineering and cloning emphasize the similarity in the functioning of living organisms on Earth observed from the viewpoint of genetics. Overlap of the human genome with Chimpanzees genom is 98%, mouse 90%, E. Coli bacteria 7% (McHughen, 2000). In light of these similarities exchange of genes between different organisms or cloning seem like a completely natural process. From this point, the genetic engineering is not fundamentally different from the breeding of plants and animals by conventional methods (selective and combinational breeding, the use of mutation and polyploidy,etc.), which man does for at least 10,000 years, since the origins of agriculture. Opponents of biotechnology and cloning, however, emphasize that this new biotechnology "break through the natural limits“ with creation "in an unnatural way," in laboratories of living beings who without human intervention, would never have occurred in nature. Thus, in an unnatural way, intolerable change in the very essence of life occurs with unpredictable adverse consequences, of which the most frequently mentioned is the occurrence of monsters. According to these opponents, "unnaturality" and insufficiently high level of existing knowledge and techniques are showed with numbers, according to which the "Dolly" project, from 277 cloning attempts had only one successful attempt.

5. ECOLOGY

Proponents of genetic engineering say that the whole concept of creating transgenic plants, especially those resistant to insects and herbicides, in fact, is the result of the aspirations of current angry opponents of transgenic plants, who want to reduce pesticide use and preserve maximum protection of environment. According to information available through the cultivation of transgenic plants, with

reduced number of treatment and the use of more efficient products, actually results can occur in savings in pesticides up to 40%.

Opponents of food from transgenic raw materials consider that the consequences of sudden introduction of atypical gene for some common plant into the human body are unpredictable and volatile. It is assumed that the transgene integrated in a "new environment" (human), can make allergic reactions or toxic effects. In the context of religious restrictions there is the question: what is that kind of food, plant or animal origin, which occurs when it incorporates (through genetic engineering) genes originated from an animal?

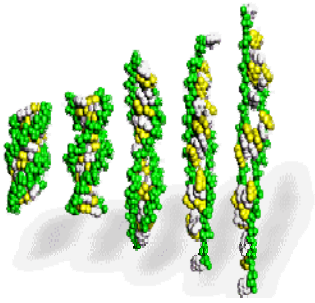
Those who have no particular objections against transgenic food note that human in its everyday life consumes significant amounts of genetic material (DNA) which is in any conventional food of plant or animal origin, including the microorganisms that spontaneously get to the human body. In the case of transgenic food, the difference is in the fact that instead of a separate introduction of genes of plants and bacteria, using of transgenic food provides simultaneous effect. Also, there is no denying of the reality of possible positional effect of transgene, ie. that the transgene, which is in itself quite harmless to humans, in the "new environment" can interact with the genes of transgenic plants, causing unexpected effects. Thoroughly testing, as a necessary part of work on transgenic plants before they are put into commercial use, is aimed to detect all potential allergens and toxins before they can represent any danger to human health that feeds on transgenic food (Robinson, 2001).

However, if the food contains a higher proportion of GMOs above the critical limit, a warning "contains GMOs" should certainly be noted, for providing objective information to consumers. Public opinion plays an increasing role in almost all events of modern democratic societies. The importance and power of public opinion is fully evident in the case of modern biotechnology. The basic feature of public debate about modern biotechnology is noisy opposition and moderate, often very shy voice of advocates of genetic engineering and cloning. Public opinion was particularly roughed with news of cloning Dolly the sheep. It immediately created a dark picture of the future full of cloned Hitlers and various monsters. Cloning immediately awakened association of eugenics,i.e. "Breeding of a man" which was particularly compromised by Nazi crimes during the World War II. The results of public survey indicate that the negative attitude towards modern biotechnology is often the result of lack of awareness and fear of unknown. That's way science and scientists have an important task of finding more efficient ways for objective education about modern science in general and about genetic engineering and cloning. In general we can say that public opinion in Europe is strongly against (Abbott, 1996), and American public is quite liberal in their attitudes to modern biotechnology. This situation however, often varies. Latest guidelines of the strategic development of biotechnology in the EU (COM 2002) noted that Europe should be more involved in the application of modern biotechnology.

An increasing number of countries, including Europe, make their legislation on GMOs and transgenic plants in order to settle all questions of creation, cultivation and use of genetically modified organisms. In this respect, our country is no exception. The official attitude of our country toward transgenic plants is not an unconditional ban on them, but careful study of this phenomenon and use all the potential benefits this technology offers.

The issue of cloning is still not regulated by legislation, nor it is adequately measured, not only here but in other countries.

6. GENETIC ENGINEERING OF FOOD



DNA is a record of the individuality of a living organism. Body reacts to the information recorded in the DNA to control every biochemical process. Life, growth, and every single property of an organism depends on the DNA. Segments of DNA that are linked to specific traits of an organism are called **genes**.

Genetic engineering (GE) is a radically new technology to manipulate genes, ie. DNA records of living beings. Unlike the traditional process of growing, GE takes genes from one form of life and puts them in another. Genes from bacteria, viruses, plants, animals and even humans, are placed in plants such as soybean, wheat, cotton, to make a commercial return. This GE return (also

called "genetically modified organisms, or GMOs) in food is converted and sold in the market.
Molecural biologists have developed many enzymes that change the structure of DNA in living organisms. Some of these enzymes can separate and combine elements of DNA. Using specific enzymes, scientists can extract specific genes from DNA and build customized DNA using these genes.
Imprecise technology - Genetic scientists transfer genes from one organism to another. Gene can be accurately taken from the DNA of an organism, but its insertion in the DNA of another organism is mostly by accident. As a result, there is a risk that it may compromise the function of other genes essential for the life of that organism.
Side Effects - Genetic engineering is like performing heart surgery with a shovel. Scientists didn't conducted studies on life systems complete enough to make DNA operations without creating of mutants who can be dangerous for people and their health. They are experimenting with very delicate and powerful forces of nature, without full knowledge of the repercussions.
Widespread crop failure - Geneticists are trying to profit from patenting of genetically modified seeds. This means that Threaten to Our Entire Food Supply - No Long-Term Test
Alergic reactions - GE may also produce unforeseen and unknown allergens in foods.
Decreased Nutritional Value - Transgenic foods may mislead consumers with counterfeit freshness.
Antibiotic Resistant Bacteria - Genetic engineers use antibiotic-resistance genes to mark the genetically engineered cells.
The problem can not be traced - Without labels, our public health agencies are powerless to trace problems of any kind back to their source. The potential for tragedy is amazing.
Side effects can kill - 37 people died, 1500 were partially paralyzed, and 5000 has been temporarily disabled by a syndrome associated with tryptophan made by genetically engineered bacteria.
Increased use of herbicides - Scientists estimate that genetically engineered herbicide resistant plants significantly increase the use of herbicides.
More pesticides – Manufacturers of GE crops often manufacture their own pesticides. This strategy will put more pesticides into our food and fields than ever.
Ecology could be destroyed - Impact of genetically modified organisms can damage the local ecology.
Pollution of gene cannot be cleaned - Once genetically engineered organisms, bacteria and viruses are released into the environment it is impossible to return them.

7. CONCLUSION

Control should be conducted by competent authorities for following:

- contained use, release into the production or marketing of genetically modified organisms and products containing genetically modified organisms for which the decision has been rendered under the provisions of this Law;
- if authorized organization is eligible to conduct tests of genetically modified organisms or products containing genetically modified organisms;
- methods of testing genetically modified organisms or products containing genetically modified organisms in the experimental field, at the farm or in the laboratory with the authorized organizations;
- security measures on introduction of genetically modified organisms into the environment;
- taking samples of genetically modified organisms and products containing genetically modified organisms without consideration, to determine compliance with the requirements prescribed by this Law.

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