

Two Important Issues in Environmental Ethics: Cloning and Genetic Engineering

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How to cite this paper: Tsekos, C.A. and Bissa, M.N. (2017) Two Important Issues in Environmental Ethics: Cloning and Genetic Engineering. *Voice of the Publisher*, 3, 34-41. <https://doi.org/10.4236/vp.2017.33004>

Received: July 18, 2017

Accepted: September 23, 2017

Published: September 26, 2017

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Abstract

This paper aims to investigate the moral dilemmas that arise in two contemporary issues, those of Cloning and Genetic Engineering. Firstly, we examine some purely technical aspects of these two issues. Secondly, we attempt an analysis of the moral and social dimensions of Cloning and Genetic Engineering. We argue that total rejection of Cloning and Genetic Engineering is neither sound nor documented, and we conclude that there are significant benefits from these two technologies. Additionally, we propose a set of actions that will help modern societies to cope effectively with these challenges.

Keywords

Cloning, Genetic Engineering, Environmental Ethics, Values, Technology

1. Introduction

It is generally admitted that Technology is advancing very fast. Very often its achievements resemble the Roman god Janus that is to say they are bifacial. Cloning is a process that has surpassed the narrow boundaries of the scientific community and has begun to engage human societies as a whole. What has been written about Cloning and has influenced the public, mainly through the Mass Media, has spurred a lot of people's minds and has created a legend about its potential. The same happens in the case of Genetic Engineering, which has contributed decisively to the production of new goods such as medicines, food, etc. As it is well known, these two issues have initiated a strong controversy over the ethical dilemmas they generate. The purpose of this article is to examine the ethical dilemmas that have been caused by the rapid development of Cloning and Genetic Engineering.

2. Cloning and Its Moral Dimensions

Cloning is undoubtedly a controversial issue, which is the subject of intense

dispute, because of its potential and the possible risks it involves. Cloning began in the 1950s with the use of frogs and became more widely known by the cloning of Dolly in 1996, which was the first mature mammal to be cloned [1] [2]. In order for cloning to take place, it is necessary to remove the nucleus of a somatic cell and insert it into an “enucleated” unfertilized egg cell [3] [4]. The synchronization of two cell cycles, *i.e.* the cell cycle of the ovum on one side and the cell cycle of the donor organism on the other side, is essential for the cloning process to succeed. In cloning by nuclear transfer, the egg nucleus is removed through a microscopic laboratory procedure and replaced by a donor’s nucleus, containing the unique genes of that individual. Thus, the clone to be born is a genetic copy of the donor organism of the cell [3] [4]. Cloning can be divided into two broad categories [5] [6] [7]:

- 1) Reproductive, when the embryo created by the previous procedure is implanted into the uterus resulting in the birth of a new organism, which is essentially a clone; and

- 2) Therapeutic, when this embryo is used to be implanted in the uterus and the birth of a new organism is used as a source of embryonic stem cells. From these embryonic stem cells it is possible that tissues and organs for transplantation will be created, as well as these cells can be used for the study and treatment of various diseases.

However, whether we are talking about reproductive or therapeutic cloning, it is a fact that human society needs to think more carefully about the foundations of human nature. Let us examine some of the moral and social dilemmas that arise from Cloning.

The first striking feature of reproductive cloning is the possible resurrection of people who have died [3]. Of course, what should be made clear is that the organism formed through cloning is the same as another organism only in terms of physical similarity, since it is impossible to re-combine all those factors of Socialization (*i.e.* School, family, friends, social conditions, etc.) that have influenced one person’s character. It is an undeniable fact that genes play a certain role in shaping one human’s personality, but they are not the only one factor that contributes to its formation. It is very likely that the clones of famous scientists, artists, politicians, athletes, etc. will be very different from the person whose they constitute a clone.

Furthermore, apart from the possibility it provides us of “resurrecting” persons who have died reproductive cloning raises additional moral questions. Even if reproductive cloning is legalized with time, many questions remain. Who, for instance, can rule out the coexistence (in a future human society) of a person and his/her clones at the same time? Therefore, where is the right to uniqueness and individuality?

Reproductive cloning also brings us face to face with serious ethical dilemmas concerning the reproduction of the human species. Cloning, as we have noted earlier, requires two cells (a cell from which the egg and a cell-donor are ob-

tained), which can be both from female individuals. Therefore, considering this issue from a purely technical point of view, we can reproduce mammals (and probably human beings) without the need for male individuals.

This issue remains of great importance, since the child born from this process will basically be a copy of a parent, except the fact that it has been “created” by two female persons! Therefore, a positive aspect of reproductive cloning is that it would give a solution to an acute problem of childless couples. On the other hand, however, we can’t overlook the fact that this process changes to a very large extent, the existing data on the mechanism of reproduction and the role of the human factor in the creation of Life. Are we ready to move on and to accept such huge changes in our lives, as the one described earlier?

A remark is necessary, we think, at this point: the rapid progress of Technology and more specifically in Life Sciences has brought us closer than ever to a situation, which many characterize as the “8th day of the Creation”. Nowadays, humanity, as a “small God”, takes over the destiny of the Creation via the modification of processes which either God or Nature determined for millions of years.

Unlike reproductive cloning, therapeutic cloning is not used for the reproduction of organisms (people or animals), but only to alleviate the human suffering. This, as mentioned at the beginning of this article, can be achieved through the creation of tissues and organs for transplantation at a time when many patients are suffering every time on endless waiting lists for a transplant liver, heart, kidney etc., due to the lack of relevant cuttings. Clearly, a comprehensive analysis of the transplantation is beyond the scope of this paper. Instead, it is useful to mention briefly that through the use of techniques of genetic modification we can create genetically-modified organs of animals, which are appropriate for transplantation into humans with little risk of rejection by the human body.

Returning to reproductive cloning, which we commented on initially, we find useful to mention a few more concerns related to this subject. More specifically, it has been demonstrated that reproductive cloning is a process which has a high degree of failure as to the final outcome (in all the stages required for its implementation). In addition, there have been reported serious health problems as far as clones are concerned, like the death of Dolly. Dolly, as it is widely known, died prematurely because when it was born it was already a very old animal.

Let us proceed this thought a step further. A pregnant woman, who is carrying a baby-clone, takes a serious risk of experiencing an abortion or bringing to life a malformed embryo. Therefore, one could argue that this woman has nearly been transformed into an object of experimentation [5]. Also, it is important to mention the fact that the development of technologies such as reproductive cloning may give impetus to the action of criminal organizations which are involved in human organs’ trafficking. Undoubtedly, such murderous and criminal organizations existed in the past and probably they will continue to exist in the future having as victims often women and children who are easier to be kidnapped.

However, it seems like a nightmare the case in which such an organization clones human beings having its ultimate goal to kill them, in order to sell their valuable organs. Such a loathsome industry of crime, without a doubt should be of concern to all of us on finding solutions for such issues that, in our opinion, will occupy us in the near future.

In our view, reproductive cloning should be prohibited due to the reasons previously mentioned and more specifically: 1) since reproductive cloning poses a direct risk to the health of humans, animals and the stable functioning of our planet's ecosystems should be made on an ongoing ban in both the public and private sector. The continuous monitoring, especially in the private sector, will be even more important, since no one can prohibit the hidden massive cloning of animals (or people even) in private laboratories, 2) the likelihood of children who are genetic copies of one of their parents is particularly repugnant and morally unacceptable. On the contrary, therapeutic cloning may contribute significantly to the relief of pain, so, at least in our opinion, its use should be allowed.

3. Ethical Issues in Genetic Engineering

Another important issue of our time is that of Genetic Engineering and Genetically Modified Organisms (GMOs). Genetic Engineering was originally developed primarily to produce new drugs and create new types of plants and animals. In fact, genetic engineering contributes to the formation of genetically modified organisms, which are not made by the normal reproduction process, but through intervention in the genome of organisms, so that this new modified genome contains the desired characteristics. We will then present to the human society the benefits of genetically engineered animals in order to help them understand the basic factors that led us to the creation of Genetic Engineering [3] [8] [9]:

1) Genetically Engineered animals can provide human compatible cells for the treatment of diabetes and organs and tissues for use in transplant surgery (xeno-transplantation).

2) Genetically Engineered animals contribute to milk production, which provides therapeutic proteins. For example, such a therapeutic protein is alpha-1-antitrypsin that can be isolated from genetically modified sheep's milk and can be used to treat children with cystic fibrosis and ant thrombin III from genetically modified goat and can be used in blood clotting prevention after surgery.

3) Genetically Engineered animals can contribute to the effort of scientists to isolate, characterize and modify genes in order to know more about their functioning.

4) Genetically Engineered animals can contribute to developing research models for human diseases. For example, genetically modified mouse carries a foreign gene ("oncogene") that causes cancer and helps us to study the cancer mechanism.

5) Genetically Engineered animals can be used for the improvement of livestock production through the creation of animals, such as chickens, resistant to infections.

In addition, genetically modified plant organisms and crops may be formed for similar reasons. The two advantages of using genetically engineered plants (plants that were created by introducing genes from one organism to another) are twofold: 1) increase in food production and poverty reduction, as well as 2) elimination of some environmental problems, due to the reduced use of fertilizers and pesticides [10]. It is worth mentioning that the genetic modification of plants was first achieved in 1983 and until nowadays the development of their use is rapid. It is characteristic the fact that in the United States, between 1996 and 2002, the use of land for genetically modified soybean cultivation increased from 1.7 million hectares to 34 million hectares [5].

It is obvious that the issue of Genetic Engineering raises various moral dilemmas related to our ability to intervene in Nature. Thus, we are heading towards an era in which the borderline between the concepts natural-unnatural will be very vague [11].

What have been mentioned above as benefits from the use of Genetically Modified Plants and Animals could be considered simultaneously as the main arguments of those who support the widespread use of Genetic Engineering applications. They, generally speaking, consider that the benefits will result from these applications and they can easily overcome any ethical and social issues that may be caused.

On the other hand, the main arguments of those against genetic engineering are that: 1) each organism is a separate, unique entity that has its inherent value. Applying techniques of Genetic Engineering and Biotechnology we exceed the acceptable limits of human intervention in the world around us and simply we don't respect this uniqueness and 2) the second argument is mainly related to the effects of the cultivation of genetically modified plants [12]. Some claim that there is a serious risk of species extinction or other risks associated with the creation of new resistant species [9]. Therefore, people against genetically modified crops argue that, if there are any serious risks to the health of humans, animals and ecosystems, it is preferable to ban such products from being placed on the market.

Undoubtedly, altering the DNA of any organization raises moral issues, since we alter the "telos" of this organization in the sense that we drastically modify its nature, its purposes and its role in the Environment in which it lives (the word "End" is used here in its Aristotelian sense). Let us think the fate of an animal that was created exclusively to be a test animal in medical experiments or to be a provider of organs via the so-called xenotransplantation in medicine. Let us also think what kind of nature (human being or something else?) has a human who, due to the lack of organs, has been forced to use a genetically modified heart that was created from a pig's heart through xenotransplantation.

It is obvious that we have already faced various challenges concerning the deeper nature of ourselves, the world around us and the acceptable limit of intervention upon the genetic material of humans and animals. It would not be an exaggeration to claim that modern scientific and technological progress in a paradoxical way is related to ancient Greek mythology and its chimeric species, such as Chimera, which was the result of breeding a lion, a snake and a goat, the Centaurus which was half a human and half a horse and the Vassiliskos which was the result of breeding a snake and a rooster [3].

Taking the previous analysis into account, it has become clear, we believe, that there must be a boundary between the beneficial biotechnological progress on the one hand and the risk of applying eugenic practices on the other [13] [14]. One of the most popular applications, for example, of Genetic Engineering is the production of human insulin for diabetics. The significance of insulin production through genetic engineering is really great if we consider that some patients are allergic to insulin that is naturally taken by animals (without the use of genetic engineering) and therefore its use is life-saving. In our opinion, it would be absurd and unethical a full rejection of genetic engineering (and its applications) by modern societies, since no scientist and no human being should remain unconcerned with regard to human suffering and the possibility of losing a human life.

4. Proposed Actions

We would propose a set of actions in order to address the serious ethical issues that are created by Cloning and Genetic Engineering. These actions are the following:

- Appointment of Environmental Ethics Committees both at State level (National Environmental Ethics Committees) and University level (each University has to establish its own Bioethics Committee). The role of these Committees needs to be upgraded from advisory to legislative, in order for them to make a more tangible contribution to the solution of the problem.
- These Committees should consist of scientists of various disciplines to achieve the interdisciplinary approach of the subject (Philosophers, Sociologists, Lawyers, Biologists, and Environmentalists).
- More public debate should be held on issues such as cloning and genetic engineering. The Media ought to give more opportunities to scientists to expound their views so that the information becomes comprehensible to the public [15].

5. Conclusions

In our era, which we could call “the age of scientific miracles”, the scientific and technological progress that takes place is so rapid that it constitutes significant and unprecedented challenges. There is no doubt that the possibilities offered by Cloning and Genetic Engineering initiate serious ethical dilemmas as far as the

future of the human species is concerned.

In our opinion, we should not reject totally new Technologies and the goods they offer to the human body. We strongly disagree with the opinion (which is common in contemporary societies) that by using Cloning and Genetic Engineering we show a tendency to represent God (“Play God” in other words), or manipulating human genome like a common tool should not be a cause for banning Cloning and Genetic Engineering.

Science and Technology have been developed to relieve pain and provide us with a more comfortable way of life on our planet. On the other hand, there should be a great deal of attention and broad social dialogue on the permissible limits of human intervention in the genome of human and non-human beings. The example which is given by Aldus Huxley in his famous novel entitled “The brave new world” is characteristic: the “state” in this novel creates citizens which are made and programmed in a Room-Laboratory in order to be happy with their jobs and their life in general. Is this the kind of Society that we want? The answer, of course, is no and the key factor in achieving a sustainable society is the appropriate use of Science and Technology.

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