

DO THE COSTS OF BIOTECHNOLOGY OUTWEIGH THE BENEFITS?

Assal Assassi

In recent years, the United States has seen an increase in technological advancements stemming from the biotechnology industry. Despite the possible benefits that can come from these developments, there are also harmful effects that members of society must reflect on before accepting the integration of these various technologies. This article advocates individuals taking into consideration both the benefits and the costs that will come from these technologies in order to decide whether or not they are fit to introduce into society.

Life in the United States today often appears to be driven by technological advancements. It is easy to fall into the trap of accepting any and all new inventions introduced by the scientific community without completely questioning the effectiveness and the impacts such inventions may have on society as a whole. While biotechnology has a great deal to offer, it is crucial not to be blinded by the seemingly flawless exterior that much of the scientific community and other large corporations attempt to present to the public. In order to prevent as much harm to the environment and ensure the health and well-being of both humans and animals, it is absolutely essential that biotechnological advancements are tested thoroughly and approved by the general public before they are actually implemented in the real world. Through these techniques, people can better reap the benefits of biotechnology while avoiding the consequences of the public's general blind acceptance of the numerous innovations that arise from it.

While many technological advancements provide exciting opportunities for the future, such as an improved standard of living and remedies to various challenges facing society, it is important to place such innovations in a larger context before they are integrated into the people's lives. Although certain new technologies may seem to make life easier or efficient when viewed alone, as Richard Sclove, a prominent author on the subject of the relationship between technology and society, states, "it might be necessary to consider not only the social dimensions and impacts associated with single

technologies, but also the combined effects that emerge from a complex of coexisting technologies.”¹ On the surface, new biotechnological advancements may often appear to provide nothing but solutions to many of life’s problems, such as using genetic cloning to help find cures for diseases afflicting humans, but it is of fundamental importance that all benefits and effects be weighed carefully to ensure that the particular technology is worth introducing into society. While the promise of genetic cloning may appear to be enough to support the advancement of the technology and its integration into society, one must also take into consideration the backlash that it might have.

By accepting the duality that is present in these sorts of situations, one can make a logical decision as to how to act after weighing the costs against the benefits of the technology in question. In situations wherein the development could be detrimental to society in the future, it is imperative that it be approached with caution. Mellon and Rissler state, “It would be unwise to brush aside concerns about genetic engineering in headlong pursuit of its benefits. Cautious development of the technology will give us the opportunity to avoid its risks and insure that it serves—not dictates—our social and environmental goals.”² It is important to conduct a deeper examination of specific technological developments than what is often presented, because by doing so, a further precaution is set in place which serves to protect society from side effects that did not appear on the surface.

Whether or not it is realized at the outset, all scientific innovations will have a lasting effect on society and those effects will be changed and multiplied when combined with the effects of other innovations that have been integrated into society. While seemingly insignificant effects such as the extinction of a specific insect species may not appear to have a large enough impact that hinders the practice of the genetic engineering of crops, when viewed in reference to the effect their extinction will have on the environment, the decision becomes more challenging. By removing a species from the environment that serves several functions because it is tied into the lives of other plant and animal species, the effects can be felt much farther than one would initially think.

While many technological advancements promise to better the world in some way, such as improving the standard of living, in actuality, they more often than not can cause much more harm. The courts and the legal system are currently the main regulators of technology, and thus, the protectors of society. The problem that arises from this is the fact that legal institutions react slowly and often cannot keep up with the

1 Sclove, Richard. 1995. *Democracy & Technology*. New York: Guilford Press, (7).

2 Mellon, Margaret and Jane Rissler. 1996. *The Ecological Risks of Engineered Crops*. M.I.T Press, (124).

rapid progress and changes in the scientific community.³ Therefore, the issue arises concerning how adequately the courts are able to regulate their continuous developments and how this affects the rest of society. Justice Breyer believes that the court must be aware of the likely social and economic impacts of technologies prior to making their decision. However, the question of how best to achieve that standard is one currently up for debate.⁴

Multi-million dollar corporations like Monsanto believe that genetic engineering is the way of the future. They argue that the technology behind genetic engineering can help the environment by reducing the use of pesticides, as well as by improving trade and creating more nutritious foods. While all of these claims seem to provide good reasons for supporting the practice of genetically engineered crops, by examining a real life side effect of this practice, it becomes clear that the issue is not as straightforward as Monsanto—the leader of producing genetically engineered crops—would like the general public to think.

The recent discovery of genetically modified corn in the village of Capulalpan located in the city of Oaxaca, Mexico raised numerous questions and concerns regarding genetic engineering. The concerns arose due to the “Mexican government [which] had outlawed the planting...of genetically engineered corn, in order to protect the genetic diversity of the crop that is the country’s most important food supply.”⁵ The fact that genetically modified corn was present in Capulalpan solidified the fears held by those against the development of genetically engineered crops as it showed that even when significant effort is made to prevent the mixing of genetically modified crops with natural crops, it can still occur.

This case of the contamination of the natural corn supply by genetically modified corn raises doubts about the claims made by the biotechnology industry that genetic engineering can be controlled in the environment. The fact that natural processes such as pollination can actually lead to the contamination of crops makes it extremely challenging to be able to control or regulate the influence of genetic engineering because the harvesting of these genetically engineered crops in a specific location does not necessarily mean they will remain in the same location. The failure of the stringent steps and precautions taken by the Mexican government such as outlawing the planting of genetically engineered corn in order to safeguard Capulalpan’s natural corn supply serves as a shining example of the difficulty of containing genetically modified crops.

3 Breyer, Stephen. 2000. *Genetic Advances and Legal Institutions*. Whitehead Policy Institute, (6).

4 Berk, Hillary. Summer 2006. *Law and Society 171: Law, Science and Technology*. University of California Santa Barbara, (6/27/06).

5 Shapiro, Mark. 2002. Sowing Disaster? *The Nation*, (11).

While on the micro level, this case of contamination in a small Mexican village may not appear to be a large enough problem to outweigh the benefits of genetically modified crops; however, when examined on the macro level, it implicates significant problems for the rest of the world. One of the aspects threatened by the uncontrollability of genetic engineering is the natural diversity present in nature. This is such a significant issue because it essentially involves the protection of the world's food supply. At first glance, the contamination of corn in Capulalpan may not cause a great deal of worry, but upon consideration of the important role that genetic diversity plays in the world's food supply, it becomes a frightening issue. As Mark Shapiro points out, "genetic diversity is what provides a hedge against unanticipated environmental changes."⁶ Capulalpan, which contains numerous varieties of corn, acts as a kind of safety net for the rest of the world. If a particular species of corn is susceptible to a certain environmental issue concerning weather conditions or animals, it will not be a significant issue because there are still many other corn species that exist to ensure that the crop will not be wiped out forever.

Regarding areas containing a diversity of crops such as the case in Capulalpan, Jane Rissler and Margaret Mellon state, "These plants are vital to the future of the world food supply, as they are the source of genes that allow plant breeders to modify crops as environmental conditions change."⁷ The uncontrollable nature of genetically modified crops paired with their potential to contaminate other existing crops, removes this safety net and thus opens the door to eliminating the world's food supply altogether.

Another directly involved issue includes the way genetically modified crops have the potential to attack the organic market. Organic farmers, such as Laura Krause in Iowa, have felt the effects of genetic engineering firsthand. Entire businesses have been destroyed because of the irreversible contamination of organic crops spread from the pollen found in genetically modified crops carried by the wind. In reference to the presence of genetically modified genes in her crops, Krause says, "There's no way for me to sort them out, because they all look exactly alike. I can't get my business back, because I don't have any way to remove this gene from this [corn] population."⁸ The fact that farmers like Krause have little, if any, legal protection in such cases only worsens the situation. In cases such as Iowa or Mexico, the victims have no way to hold anyone accountable for the damage done by genetically modified plants.

Corporations like Monsanto, who are behind much of the

6 Shapiro, Mark. 2002. Sowing Disaster? *The Nation*, (11).

7 Mellon, Margaret and Jane Rissler. 1996. *The Ecological Risks of Engineered Crops*. M.I.T Press, (121).

8 Shapiro, Mark. 2002. Sowing Disaster? *The Nation*, (18).

progress taking place with genetically modified crops, claim that the scientific advancements will greatly benefit the public and the environment. One of the primary arguments at the forefront of this debate is based on the development of Bt corn. This type of genetically modified corn produced by Monsanto “contains a gene inserted from a bacteria that prompts the plant to produce its own insecticide.”⁹ The argument in favor of Bt corn asserts that by embracing this technology, farmers will be able to cut down on the amount of pesticides they use in order to protect their crops from unwanted pests, which in turn will benefit the environment. As Vandana Shiva points out; however, the problem with this argument lies in the fact that, “Bt-crops can actually create ‘superpests’ and increase the need for pesticides [and] long-term exposure to the toxins promote the development of resistance in insect populations.”¹⁰ Not only do innovations such as Bt corn include the risk of creating pests which are immune to pesticides, they also pose the risk of harming other animal species, such as birds and butterflies, which are responsible for pollination.¹¹ While crops like Bt corn can potentially harm animal species other than those intended, it is also important to realize that the ingestion of Bt corn can possibly harm humans as well.

While there are numerous ways in which the effects of biotechnology can indirectly harm humans, such as the issues previously discussed regarding genetically engineered crops; it is important to note that biotechnology can take other forms which pose more direct harm to humans. One of the most prominent examples of the direct impact that biotechnology has on humans includes human cloning. Human cloning is the production of individuals who are genetically identical to an already existing individual.¹² When discussing this topic, it is important to be able to differentiate between the two types of cloning: reproductive cloning and embryonic cloning. Embryonic cloning, which is the first step in reproductive cloning involves the creation of cloned embryos for research purposes, while reproductive cloning involves the production of a clone in order to initiate a pregnancy.¹³ The advocates of cloning believe that it is a critical advancement in technology that

9 Shapiro, Mark. 2002. Sowing Disaster? *The Nation*, (14).

10 Shiva, Vandana. 2000. *Stolen Harvest: The Hijacking of the Global Food Supply*. Cambridge: South End Press, (106).

11 Shiva, Vandana. 2000. *Stolen Harvest: The Hijacking of the Global Food Supply*. Cambridge: South End Press, (107).

12 Kass, Leon. 2001. Preventing a Brave New World. *The New Republic Online*, (130).

13 Berk, Hillary. Summer 2006. *Law and Society 171: Law, Science and Technology*. University of California Santa Barbara, (7/13/06).

must be pursued because it offers the potential for curing many human diseases and ailments afflicting the population. A few of the arguments provided by those in support of human cloning include that its pursuit will assist those in need of organ transplants. For example, by providing a greater number of available transplants than would be available without cloning, the potential to cure deadly diseases such as cancer may increase. Those in support of human cloning point to a multitude of possible benefits from the implementation of human cloning, yet one cannot ignore the possible backlash that could result from these cases simply because the possibilities sound appealing.

One of the highly debated issues includes whether or not reproductive freedom will be encouraged or inhibited by human cloning. Those against human cloning raise the point that because there need not be any personal involvement on the part of the individual who is to be cloned, genetic material from deceased or living people could easily be used without their consent.¹⁴ On the other hand, those in support of human cloning feel that it allows humans to take complete control over their reproductive freedom in a way that would be impossible without it. This value placed on human control is explained by Richard Hull, "...the ability of my species to manage its own evolution to be one of its most wonderful emerging properties, [is] an ability that distinguishes humans from every other species."¹⁵ The question of control over all aspects of an individual's life, including reproduction, is one that relies heavily on ethics. Leon Kass states, "Though we favor freedom of inquiry, we recognize that experiments are deeds and not speeches, and we prohibit experimentation on human subjects without their consent, even when cures from diseases might be had by unfettered research."¹⁶ While this mastery and control over oneself may be a highly-prized goal for some, it is important to recognize that this technology has the potential to grant that power to one individual over another. This form of control is not in accord with the standards of American society, which are founded on the individual's rights. By allowing the practice of human cloning, the class of individuals in charge of the act will be elevated above the class of individuals who are the subject or victims of the act. Those carrying out the cloning will be given the power to determine the life of the clone without seeking any form of consent or approval from the individual cloned.

Those in support of human cloning turn to the success of animal cloning as a means to encourage others that human cloning should also

14 Kass, Leon. 2001. Preventing a Brave New World. *The New Republic Online*, (6).

15 Hull, Richard. 1998. *The Benefits of Cloning Outweigh the Risks*. Greenhouse Press, Inc., (18).

16 Kass, Leon. 2001. Preventing a Brave New World. *The New Republic Online*, (4).

be pursued. What some call success, others feel is blatant proof as to why human cloning should not be pursued. When looking at the history of animal cloning, one must make his or her own value judgments in order to determine whether one will be for or against human cloning. Supporters of human cloning claim that because cloning has been performed successfully on animals, it opens the door to pursuing the technology and experimentation with humans. In response to those who feel that attempting human cloning is far too dangerous, those in support of it argue that more study and experimentation is required before it should ever be tested on humans. Richard Hull, an advocate of this view argues, "...while I think the technology should continue to be developed, it would not be appropriate to try it in humans."¹⁷ While advocates of human cloning believe that statements like this serve to satisfy the moral questions involved in human cloning, those against it believe that human cloning should never be permissible. The fact is, the successful cloning of Dolly the sheep was only one success out of 277 attempts.¹⁸ The only way to ever be certain of the effects of human cloning would be by testing it on humans. As pointed out by the National Bioethics Advisory Commission (NBAC), "If attempted in humans, it would pose the risk of hormonal manipulation in the egg donor; multiple miscarriages in the birth mother; and possibly severe developmental abnormalities in any resulting child."¹⁹ Keeping the statistics regarding Dolly in mind as well as the possible risks laid out by the NBAC, it becomes evident from a moral standpoint that it will never be permissible to test cloning on humans because the likelihood of encountering tragic results is almost guaranteed. No individual has the right to knowingly submit other individuals to a life of pain and discomfort, even if it is in the name of science and technology.

Not only are there risks regarding the health of the clone but also major concerns involving the upbringing and the future of a clone. The very idea of creating a clone of another individual raises other ethical questions because it denies the cloned individual a life of their own and control over it, which is a fundamental right of every individual. If the decision was made to clone an adult individual, the clone would lack a sense of identity that can only be developed through the course of living one's life. The clone could rightly feel alienated from the world, and even themselves because of the inherent feeling that their life has been predetermined by the individual who they are a clone of. The NBAC also states, "It will seem that one's life has already been lived and played

17 Hull, Richard. 1998. *The Benefits of Cloning Outweigh the Risks*. Greenhouse Press, Inc, (19).

18 National Bioethics Advisory Commission. *The Risks of Human Cloning Outweigh the Benefits*. Greenhouse Press, Inc., (24).

19 National Bioethics Advisory Commission. *The Risks of Human Cloning Outweigh the Benefits*. Greenhouse Press, Inc., (24).

out by another, that one's fate is already determined, and so the later twin will lose the spontaneity of authentically creating and becoming his or her own self."²⁰ The fact that a clone will not be their own person opens up the door to a whole body of people who are dissatisfied with their lives and who lack a sense of individuality.

Like any other technological advancement, those falling into the category of biotechnology have the potential both to help and harm society, as well as the environment. It is the responsibility of the public, the people who these technologies will affect, to make knowledgeable decisions as to whether or not the innovation should be incorporated into society. The only way for the public to be able to effectively make informed decisions is if they make an effort to investigate new concepts and ideas that are presented to them critically rather than merely accepting them because they feel obliged to. Ruth Hubbard states, "...we need to keep informed, so that we can say 'no' whenever and wherever we want to, and do not become overwhelmed with the quantity of specialized knowledge involved."²¹ An educated public is the key to protecting the future, because without it, individuals will be taken advantage of by scientists and corporations who hold the body of knowledge, and at times, may not have the public's interests in mind.

Through this, individuals will avoid finding themselves in a situation wherein they feel they have been used and taken advantage of. By being informed, the public will have the power to make decisions during the most critical stage of the process. As stated by Hubbard, "Choices need to be made at the beginning, before a technology becomes so entrenched that cultural norms call for only one approved way to choose."²² By being informed and investigating possible outcomes before the fact, one can avoid falling into a situation in which there is no other choice but to accept the technology because it has become so deeply-rooted in society. While genetically-modified foods and human cloning both have the potential to solve many of society's problems and change the way life itself is perceived, they are both accompanied with drastic consequences that outweigh any possible benefits.

20 National Bioethics Advisory Commission. *The Risks of Human Cloning Outweigh the Benefits*. Greenhouse Press, Inc., (28).

21 Hubbard, Ruth. 1995. *Of Genies and Bottles: Technology, Values and Choices*. Monroe, ME: Common Courage Press, (153).

22 Hubbard, Ruth. 1995. *Of Genies and Bottles: Technology, Values and Choices*. Monroe, ME: Common Courage Press, (158).

WORKS CITED

- Berk, Hillary. Summer 2006. *Law and Society 171: Law, Science and Technology*. University of California Santa Barbara.
- Breyer, Stephen. 2000. *Genetic Advances and Legal Institutions*. Whitehead Policy Institute.
- Hubbard, Ruth. 1995. *Of Genies and Bottles: Technology, Values and Choices*. Monroe, ME: Common Courage Press.
- Hull, Richard. 1998. *The Benefits of Cloning Outweigh the Risks*. Greenhouse Press, Inc.
- Kass, Leon. 2001. Preventing a Brave New World. *The New Republic Online*: 1-19.
- Mellon, Margaret and Jane Rissler. 1996. *The Ecological Risks of Engineered Crops*. M.I.T Press.
- National Bioethics Advisory Commission. *The Risks of Human Cloning Outweigh the Benefits*. Greenhouse Press, Inc.
- Sclove, Richard. 1995. *Democracy & Technology*. New York: Guilford Press.
- Shapiro, Mark. 2002. Sowing Disaster? *The Nation*: 11-19.
- Shiva, Vandana. 2000. *Stolen Harvest: The Hijacking of the Global Food Supply*. Cambridge: South End Press.