Biological Forum – An International Journal **7**(1): 371-374(2015)

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Ethical Issues in Genetic Engineering

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(Received 07 February, 2015, Accepted 19 February, 2015)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: Biotechnology is the use of living systems and organisms to develop or make useful products, or any technological application that uses biological systems, living organisms or derivatives thereof, to make or modify products or processes for specific use. it is at the intersection of science and ethics. Technological developments are shaped by an ethical vision, which in turn is shaped by available technology. Biotechnology can produce unanticipated consequences that cause harm or people. The ethical assessment of new technologies, including biotechnology, requires a different approach to ethics. Changes are necessary because new technology can have a more profound impact on the world. Given the potential to profoundly change the future course of humanity, such questions require careful consideration. The power and potential of biotechnology demands caution to ensure ethical progress.

***Keywords*:** Bioethics, Biotechnology, Personhood, Responsibility, Rights

INTRODUCTION

Biotechnology is about understanding life and using this knowledge to benefit people. Many see biotechnology as a significant force in improving the quality of people's lives in the 21st century. A two-way flow exists in which ethics influences biotechnology even while the science impacts ethics. The relationship between biotechnology and ethics is portrayed as one of conflict. Sometimes the impression is conveyed that ethics is needed only when someone wants to tell others that what they are doing is wrong. To a degree, this is understandable since controversy, debate and argument are usually integral to ethics discussions (Kochhar *et al*, 2005).

Ethics is just as important when there is consensus that a direction is good and right. The role of ethics is often invisible at this stage. There wasn't an ethical debate over whether to search for a cure for cancer. But the decision to pursue such research was motivated by a common vision that curing cancer was the ethical thing to do. Ethical examination of issues is important not only as a form of critique but also to identify and celebrate the right things people do. There is much to celebrate about biotechnology. Society and individuals have benefited in many ways from technology. Many technological developments protect people from illnesses and natural disasters, giving some people "liberation from the tyranny of nature (Panzini and Lorenzini, 2004).

Other ethical considerations must be considered. Some developments seem motivated by a desire to find treatment at any price. Assisted human reproduction is a particularly controversial area where biotechnological treatment of infertility leads to many ethical dilemmas. Even with less controversial conditions like heart disease or cancer, developments have left people with high expectations that cures should exist. Ethical concerns exist about justice, and how fairly these technological benefits are distributed—both within society and around the world. With all the options now available for some, concerns are raised about whether too much choice is bad for us. Many of the concerns about technology can be traced to the technological imperative: the idea that something should be developed because we can or we think we can. The distinction between a technological mandate and the technological imperative rests on the ultimate goals of biotechnology (Moreau and Jordan, 2009).

TARGETS OF BIOTECHNOLOGY

Ethics includes assessment of the rights and wrongs of specific technologies and applications (like cloning or genetic diagnosis). Another important pursuit within ethics is examining the broader goals and aims of enterprises like biotechnology. The relief of sickness is one goal, but there are others that can be more ethically controversial (Azevedo and Cerqueira, 2013).

Developing the necessary biotechnology for engineered negligible senescence assumes that indefinite life extension is good for humanity. Even if accepted as an ethical goal, it would be one goal among many. Would it be the most appropriate goal for biotechnology? This question is especially pertinent given the limited resources available for biotechnology. Resources are also needed for education, to better distribute the healthcare resources already available, and to provide debt relief for poorer nations. How much investment towards the goal of indefinite life-extension would be in keeping with global justice? While people in developed countries can expect to live into their 80s, the average life expectancy at birth in 2003 was still in the 30s in some African countries (Powledge, 2013).

These types of questions require ethical evaluation. Time should be taken to reflect on the broader implications of pursuing biotechnology. For example, the Center for Responsible Nanotechnology claims that "much industry can be directly replaced by molecular manufacturing." The economic fall-out from such developments would be immense, leading to significant social changes with the potential for good and harm. These ethical issues need careful examination even before the technological issues are resolved (Kavitha and Azariah, 2011).

Taking the time to reflect on these aspects of scientific developments can be difficult, especially with the pace and focus within biotechnology. The pressures of competing for funding, making breakthroughs, securing intellectual property, and obtaining market share all push against calls for caution or time-consuming reflection. Technological development can seem like a motorway, everyone on the fast track to success. Ethics, even when well intentioned, can seem like a diversion or a road-block that prevents biotechnology reaching its destination, or delays it inexcusably (Castillo, 2005).

CHALLENGING CHARACTERISTICS OF BIOTECHNOLOGY

A. The vulnerability of nature

Human dealings with the non-human world were regarded as ethically neutral. The capacity for new technology to have global impact shows that ethics needs to broaden its focus. Environmental problems and the existence of nuclear technology demonstrate the importance of ethical examination of more than just human–human interactions (Patel, 2011).

New technology also highlights the vulnerability of nature. Previous technological developments appeared to assume that natural resources were in endless supply and that nature could rebound from any human impact. Environmental changes show these assumptions were problematic. Ethical evaluations of biotechnology need to take the vulnerability of nature into account. At the same time, a concern for these broader issues can lead to new technological challenges and exciting research opportunities, such as has occurred with research into renewal energy sources stemming from ethical concern for the environment (Verma *et al*, 2013).

B. Future consequences

Earlier technology impacted humans and their lives, but did not have the potential to change human nature. Biotechnology does. With that comes the potential for broader and long-range consequences. Predictions about these consequences can be difficult and unreliable. This is particularly cogent with genetic technology. The consequences of our ability to manipulate the human genome could impact many, if not all, future generations. The way genes interact with one another means that manipulating one gene could have unintended effects on other genes or their expressed proteins (Do nal and Mathu, 2007).

Biotechnology's mistakes may produce problems, but so too might its successes. As technology has developed and spread, "the more all of reality is seen as matter-of-factly material and hence as controllable in a completely technical and rational manner. Successful technological solutions could lead people to view all our problems as needing a technological fix (Do nal and Mathu, 2007).

Biotechnology has the added capacity to produce products that literally do take on life. The technology humans developed in the past was inanimate and could be left unused if found to be ethically problematic as difficult as that might have been. However, biotechnology now makes possible the creation of products that are themselves alive. The work of [human] hands takes on a life of its own and independent force, no longer figuratively but literally. The living products of biotechnology are no longer under human control in the way an inanimate machine was. Now the living product itself could influence its impact and might develop into new forms of life with unexpected consequences (Macer *et al*, 2009).

Such factors should remind us of the place of awe and mystery in the face of nature. We humans are limited in our ability to understand, control and direct nature. It should lead to a sense of caution. Yet often the very opposite is the case, with the pressure to rush to be the first to develop something new. The precautionary principle is particularly pertinent with experimentation on humans (Leisinger, 2010).

C. Central place of responsibility

The enormity of the potential impact of biotechnology on human nature should cause us to proceed cautiously. Biotechnology has the potential to do great good. But it also has the potential to cause much harm. This could arise in the physical realm through unexpected consequences of the technology itself. But other harms could arise through the non-physical impacts of biotechnology. Cars and computers have affected many aspects of human life and society. Biotechnology could change what it means to be human (Koch, 1998).

A rights approach to ethics makes clear where people have rights. Each right carries a corollary duty or responsibility. If people have a right to healthcare, someone has the responsibility to provide healthcare resources. Much energy has been expended identifying and defending human rights. We now need a similar emphasis on human responsibilities (Majdah, 2001).

Responsibility is also a corollary of power. Biotechnology brings new powers to humanity. These powers should remind us of our responsibility to nature and the environment, to all of life, to the future, and to human nature and personhood. To understand these responsibilities entails the development of wisdom. That wisdom requires ethical reflection before developing specific forms of biotechnology. Taking the time for that reflection can go against the pace of biotechnological developments and hubris over human wisdom (McElwee, 2009).

Jonas warned that new technology was propelling us towards a utopian future. Aubrey de Grey exemplifies that vision for biotechnology. These developments have the potential for much good, but also risk changing, harming or even destroying some species, including ourselves. To make the right ethical decisions requires supreme wisdom an impossible situation for man in general, because he does not possess that wisdom, and in particular for contemporary man, because he denies the very existence of its object, objective value and truth. We need wisdom most when we believe in it least (Nicholas, 2000).

Jonas was referring to the post-modern rejection of objective truth that has become so prevalent the idea that all answers are equally valid. In contrast, ethics searches for better answers to ethical questions. It acknowledges the limitations in current wisdom, and strives to improve our understanding. The way forward is muddied by our inability to accurately predict the consequences of proposed biotechnological developments. Some argue that we should push ahead and deal with problems as they arise. But given the scale of disaster that biotechnological mistakes could trigger, Jonas guiding principle contains much wisdom. He argued that "ignorance of the ultimate implications becomes itself a reason for responsible restraint as the second best to the possession of wisdom itself (Nordlee, 2010).

Time and resources must be committed to examining the ethical implications of proposed biotechnological developments. The potential impact on all aspects of nature must be considered. The social, emotional and spiritual implications of developments in biotechnology must also be examined. When humans themselves are the objects of biotechnology, great caution is necessary lest we promote a view of ourselves and our neighbours as nothing more than living bits of technology (Spie, 2000).

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