

Biotechnology:

The Future

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Biotechnology is sometimes seen as a form of biological manipulation that is immoral. With the strides that have been made on this scientific frontier in the last few years, many people are starting to question what we deem more important: survival or tradition. With that in mind, the possibilities of this new basis for technology may hold the key to maximizing human innovation and lifespan, while providing a better understanding of the universe and how we fit into it. This is something, I believe, that humankind should embrace, not fear.

Survival is considered to be an instinct, one that we all share. But the extent to which our instincts develop depends on our surroundings, family, and the ability to perceive through specific awarenesses. A Norwegian political scientist, Christian Lange, gave a brief example of this scenario when he said, "All species capable of grasping this fact manage better in the struggle for existence than those which rely upon their own strength alone: the wolf, which hunts in a pack, has a greater chance of survival than the lion, which hunts alone." Lange's words relate largely to why humans have developed so much faster compared to the rest of the animal kingdom – at least in terms of visible dominance, such as population density and environmental construction, as well as the ability to demonstrate what we deem to be knowledge.

Survival and biotechnology are very symbiotic. We have learned recently how to engineer plants that can survive climates in which their

original genus would have died instantly. We have engineered so many varieties of corn and potatoes that pesticide use has decreased globally because of plant resistance. There have also been improvements in fertilizer usage because of these genetically modified crops. Some have seen upwards of 30% output gains, even with lowered fertilizer levels. The scientific community has also largely delved into the study of rice, especially regarding Puccinia fungi, otherwise known as "rust", a plant pathogen responsible for a large percentage of famines throughout history. Rice is so far the only cereal that has immunity to Puccinia. This is why the Asian dynasties with rice crops never suffered from famine, but some Western cultures with wheat and barley crops suffered drastically. Some may claim that this is what gave the Asians a slight intellectual advantage in the 21st century. The Western civilizations' ability to learn and innovate may have been stunted ever so slightly because of the traumatic effects of famine and the severe lack of nutrients, both of which would have prevented brain growth and mental development.

The future of biotechnology is currently flourishing in agriculture, but there are other sectors that may have even larger ideas than we thought possible. Our new understanding of modern biology is allowing us to cure diseases faster and more discreetly. We can re-program bacteria to avoid side-effects and minimize end-game health risks. In turn, we are able to more precisely target diseases throughout the body, making treatment

faster, and cheaper. More importantly, the research being done is being used in developing countries to prevent infectious diseases and outbreaks. This is allowing for faster development and possibly a future where new nations emerge as cultural powerhouses bringing their new ideas to the forefront and sharing and contributing to the future innovation of the technologies that helped them prosper in the first place.

In addition, biotechnology is enhancing the sustainable energy vision, providing new ways to clean our environments and increase manufacturing efficiency. By defining key aspects within chemical engineering we are now able to streamline chemical manufacturing by upwards of 80% in updated facilities. This reduces the need for petrochemicals and in turn minimizes negative emissions by 52% or more. The ability to maximize biological potential has made the energy industry more efficient and less environmentally devastating to the environment.

In the future, the world will have the bio-technological capability it needs to feed and sustain its 8.3 billion human residents, and scientists are saying within the next 12 years this will be true. Yet there are still extremists that challenge the direction of science and the crossing of a threshold, human and God. The battle of science and a greater being, be it of any religion, is not a new one, but this time around it seems that science is taking the lead and proving that it is not the devil's work.

The 'Human Genome Project', for example, started the mapping of our human genome in 1990 and submitted its findings in April of 2003. The project's findings included a complete mapping of the human genome, identifying its genes, and gene specific proteins, as well as an analysis of the possible pros and cons that may arise due to the scale of the findings. This research piloted hundreds of biotechnological and biomedical studies for the next two years, and provided us with around 350 new applications for biotechnology. The project then released a comprehensive map of genetic variation in October of 2005. The map is now the basis for many larger studies focusing on diseases, disorders, and physical variation in the human genome. The 'Cancer Genome Atlas' pilot project is the continuation of the original Human Genome project. It is dedicated to the comprehensive exploration and development of test strategies to combat cancer cells of the 50 major cancer types throughout the body.

These are only two examples of the many studies done within biomedicine, but they are prime examples of how biotechnology is being used to maximize the human lifespan. Still, the question needs to be asked, given the enduring consequences of biotechnology research.

Is it right to test the laws of biology, or should we be restraining ourselves from these advances because of beliefs?

In my opinion, biotechnology has many beneficial applications and should not be deemed a destructive science. The proof is there. It is only a matter of time before the modern world becomes reliant on biological technologies to innovate. Whether or not religion decides to fight it, accept it, or deny it, only time will tell. Science and technology, however, will continue to develop in the pursuit of ultimate knowledge and understanding, and many see biotechnology at the forefront of this exciting frontier in science.

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