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Social Paradigm of Biotech

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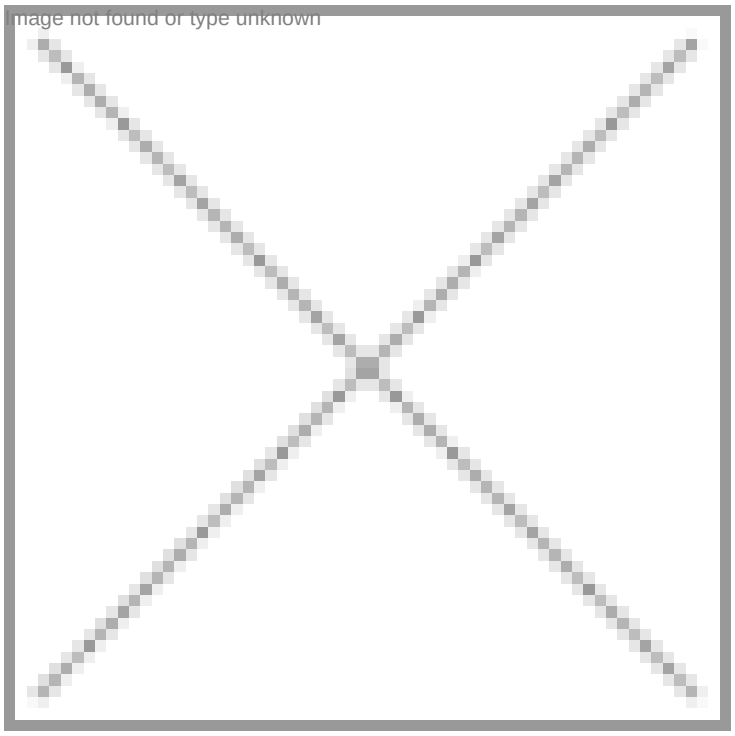

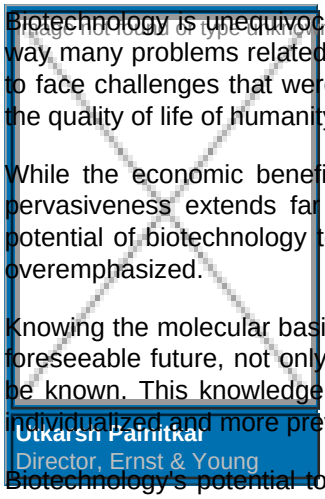

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Biotechnology is unequivocally one of the greatest technological revolutions of the last century as it is radically changing the way many problems related to human existence are faced and dealt with. Not only is it providing humankind with new means to face challenges that were previously considered insurmountable, it is also creating extraordinary opportunities to improve the quality of life of humanity as a whole.

While the economic benefits of biotechnology in terms of investment and employment are becoming more apparent, its pervasiveness extends far beyond the factories and research centers of the world, influencing our everyday lives. The potential of biotechnology to revolutionize healthcare, augment food supply and provide a safer environment can hardly be overemphasized.

Knowing the molecular basis of health and disease leads to improved and novel methods for treatment and prevention. In the foreseeable future, not only will every human gene have been identified, but the factors controlling their expression will also be known. This knowledge will unlock new targets and fundamentally transform the practice of medicine, making it highly individualized and more preventive rather than simply therapeutic.

Biotechnology's potential to find new remedies and cures is limitless - starting from vaccine production for deadly diseases such as malaria, TB and leprosy to genetically engineered organisms from bacteria, yeast, plants and animals which are producing insulin (anti-diabetic drug), human growth hormone (to treat dwarfism), monoclonal antibodies (to treat arthritis, asthma and cancer,) and other hitherto unheard-of drugs in treating hereditary, infectious, degenerative and lifestyle diseases.

Improving the reliability of diagnosis is arguably as important as finding new cures. Biotechnology has been extraordinarily effective in this respect offering, not only reliable new diagnostic tools such as DNA probes which are providing breakthroughs in early diagnosis of disease, but also the possibility of predictive genetic tests for genetic disorders.

Society is already beginning to reap the health benefits of advances in food biotechnology. Some of these benefits involve improvements in food quality and safety, while others provide consumers with foods designed specifically to be healthier and more nutritious. For instance, using biotechnology, plant scientists have decreased the total amount of saturated fatty acids in certain vegetable oils and a variety of healthier cooking oils derived from biotechnology are already on the market. Biotechnology researchers are also increasing the shelf life of fresh fruits and vegetables; be it improving the firmness of tomatoes, creating seedless varieties of grapes and melons or extending the seasonal geographic availability of fruits like strawberries and raspberries.

At a much higher plane, biotechnology holds the solution to the grave challenge of global food security. The global population, which numbered approximately 1.6 billion in 1900, has surged to 6 billion and is expected to reach 10 billion by 2030. The United Nations Food and Agriculture Organization (FAO) estimates world food production will have to double on existing farmland if it is to keep pace with the anticipated population growth. Biotechnology can help meet this challenge through sustainable agricultural development by increasing yields of crops, enhancing their tolerance to stress and resistance to disease, decreasing inputs such as water and fertilizers and helping crop cultivation in arid climates.

Biotechnology has also shown promise for achieving industrial sustainability- continuous innovation, improvement and use of â€œcleanâ€? technologies to make fundamental changes in pollution levels and resource consumption. Biotechnological solutions to many essential industrial processes that currently produce toxic effluents is helping in better environmental management.

The techniques of biotechnology are providing us with novel methods for diagnosing environmental problems and becoming better-informed environmental stewards. For instance, disposal of domestic waste to excavated sites (landfill) has been practiced for more than 5000 years, but has only recently been regarded as a problem that might be alleviated by bio-remediation.

Looking at the broader picture, biotechnology can impact our social fabric in more profound ways. Improved genetic tests based on biotechnological advances can be used to accurately track down and bring criminals to justice in assault cases, based on the uniqueness of their DNA. Biotechnology has also furthered the cause of an egalitarian society. The completion of the Human Genome Project has a profound symbolic significance in this regard. It has conclusively proved that there is no genetic basis for race, as humans all over the world share 99.9 percent of their DNA. The long held belief of racial discrimination having its basis in biology has been dealt a deathblow by this discovery as it has completely turned the traditional race-based measurement of human differences on its head.

We are in the early stages of a major revolution in life sciences and biotechnology that will impact every aspect of our society. Biotechnology represents a tremendous power which can be enabling or disabling. Biotechnology holds great promise, but involves new risks.

Biotechnologies have undoubtedly raised challenging environment-related, ethical and social issues that demand an open forum. The socio-ethical debate surrounding biotechnology involves questions of the method and of its many applications. Biotechnology, then, is an opportunity for a public debate over how our society will develop more broadly. It is not the science of biotechnology that is in question. It is the manner in which specific applications of biotechnology will affect the way we live that is in debate.

In most countries, the scientific, political, economic or institutional basis is not yet in place to provide adequate safeguards for biotechnology development and application, and to reap all the potential benefits. Until a socio-ethical framework is developed, each application of biotechnology will revive the debate yet again. Developing a socio-ethical framework to direct the applications of biotechnology will lend legitimacy to its eventual, beneficial, uses.

Regardless of the intense debate, an element of biotechnology upon which nearly everyone agrees is that the field is at the beginning of a technology curve whose upside potential appears limitless. The major benefits on the horizon will only be realized if society accepts biotechnology and resulting products as ethical and safe. Provided such vigilance is maintained, mankind can look forward to a wide range of exciting prospects that stem from biotechnology. It is clear to all that the best days of biotechnology are ahead of us, not behind us.