ADVANCES IN BIOTECHNOLOGY CURRENT TRENDS AND ITS FUTURE SCOPE

Abstract

There are many techniques that can be used to modify living organisms for human use. The development of technologies based on biology can be seen in the field of biotechnology. Future developments in the field will balance various domains of application as the notion of biotechnology can be applied to a wide range of fields. Here, we focus on medical biotechnology and broaden our debate by taking genetics and nanotechnology into account, which will impact the future growth of medical biotechnology.The systems play an important role in human health.This is used to make it easier to remember how to categorize various biotechnology researches. In the coming years, biotechnology will become a life-saving tool for many important diseases and epidemics. It also facilitates the cloning and expression of many prophylactically important proteins and peptides that can be used to develop new subunit vaccines. In fact, biotechnology and biochemistry have a huge impact on health, food, agriculture and the environment. The purpose of the meeting is to identify the importance of the research and the deficiencies. It also provides an opportunity to discuss how to best manage risk and public acceptance of this new technological disruption.

Keywords- Biotechnology; Applications; Agricultural and Industrial biotechnology; Nanotechnology; Medical biotechnology; Future Scopes.

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I. INTRODUCTION

Biotechnology is a cutting-edge field of study that has It has expanded quickly in recent years and is at the forefront of innovation and research. It is a vast field that employs biological processes or living organisms to develop new technologies that may alter the way we live and work and increase productivity and sustainability.Widely applicable new technologies and products are being developed for industries like pharmaceuticals, agriculture, energy, manufacturing, and food.

The term "biotechnology" refers to life and technology. In recent years, it has continued to grow. Agricultural and livestock products and services, as well as food, medicines, and therapeutic products, are included in the field of biotechnology. It is difficult to define and explain the diverse applications of biotechnology. Others think it's similar to genetic engineering, while others think it's related to industrial microbiology (1). A few sources refer to it as appliedbiology (2).

Different experts and scientists see the distribution of various branches differently. The points at which many sciences meet and are connected are the basis of most classifications. There are two examples of medical and agricultural biotechnology. There are a lot of different types of biotechnology, such as marine, forensic, environmental, food, bioinformatics, industrial, petroleum, laboratory, and so on (4) (Figure 1).

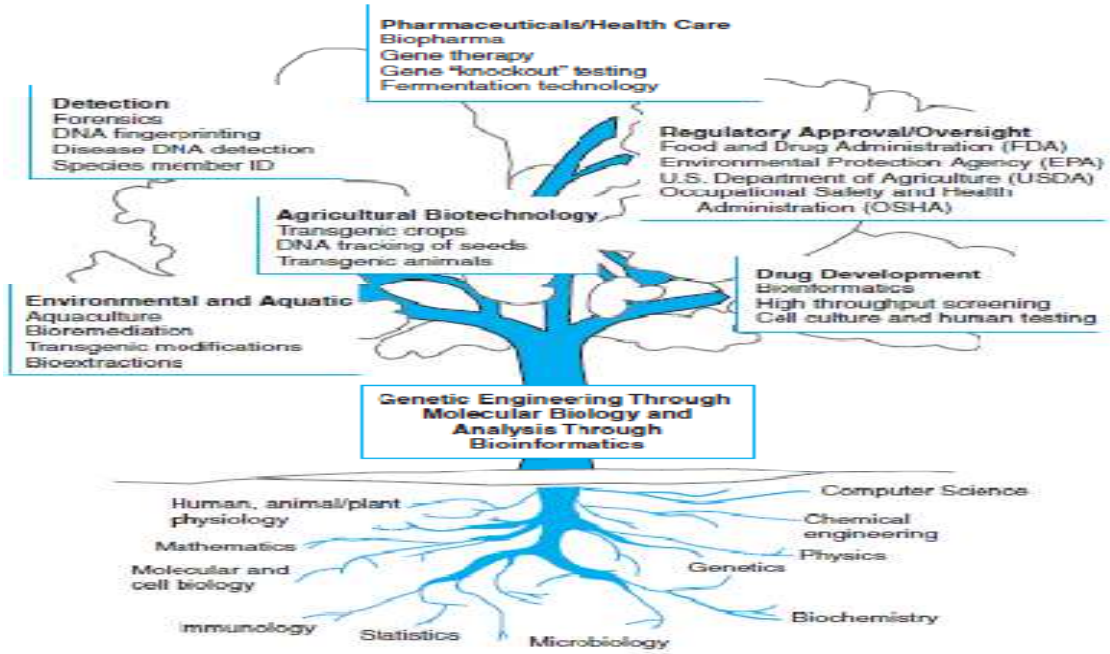

Figure 1: Diagram of requirements and outputs of the biotechnology industry.

Biotechnology combines the use of science and engineering to process biological products and provide products and services. It can also be defined as the skills required to use living machines or natural processes to create products, services or environments that will support their development. Living organisms are used to make or modify products, to heal animals and plants, or to create drugs for specific uses (5). There are many types of

biotechnology; They are categorized by color. Primarily, red biotechnology, i.e. pharmaceutical biotechnology, is used in drug production, pharmaceutical industry, development of drugs and vaccines, molecular diagnostic technology, and also contributes to genetic engineering to treat disease from genetic diseases.

Second, free biotechnology, also known as industrial biotechnology, is free biotechnology where microorganisms are used in chemical production to extract living cells from plants and yeast to produce products that need less help. They also reduce waste by producing new plastics and biofuels in the process. The third category is green biotechnology, also known as agricultural biotechnology. It is divided into agricultural biotechnology and environmental biotechnology. Agricultural biotechnology is often associated with technologies related to the production of more important crops or the development of new antibiotics that reduce the need for chemicals. It also aids plant growth and increases crop yields. Environmental biotechnology focuses on ecological problems such as removing pollutants, generating electricity from renewable sources and converting plants into biofuels. It is also trying to create bioplastics that are good for the environment and can reduce the use of biogas or other waste energy. Finally, blue biotechnology, also known as marine biotechnology, focuses on marine life that can be used for many human purposes, such as drug production and improving human health. It is used in the manufacture of human antibiotics and can be obtained from the venom of cone snails.

Blue Biotechnology is responsible for the production of proteins, enzymes and biomaterials (6). Biology regularly publishes research papers reporting significant advances in many biological disciplines. However, as the use of biology becomes more widespread, our resources must continue to evolve and become technologies that can change activities and environmental impacts in the environment. To this end, we have recently published a paper in the journal focusing on ideas for green biotechnologies that will play an important role in the future (7), including how microbial photosynthesis can be used directly for electricity (8) and carbon "sinks" in the mining industry. using microbes to create (9) . We also publish perspectives throughout the year that evaluate the last 20 years of biological research in specific areas and predict the next 20 years (10); In this case, these thoughts focus on the broads. biotechnology field – different aspects of synthetic biology (11). The use of lipid nanoparticles (LNPs) to deliver therapeutic agents (12).

Biotechnology is a broad field that involves creating technology based on biology. It has a long history of using bacteria to produce food like bread and cheese. Modern biotechnology offers solutions for rare diseases, environmental sustainability, and global food supply. It promotes the use of clean energy and is economically efficient (13). Biotechnology can be applied to various areas, and future developments will spread across different applications. In this discussion, we focus on medical biotechnology and explore how genetics and nanotechnology will shape its future development.

Artificial biology is subject in which current digital or biological substances are designed to create products or improve mobile characteristic. Scientists are able to create organisms which could be used to make drugs, tablets, and biofuels. Kitano and associates describe strategies which could cause the diagram-build-experiment-work cycle in artificial biology and recognition on how gadgets can voluntarily take away the hookah (14).

The basic sciences have benefited from the advancement of technology. The development of super-resolution microscopy allows researchers to image cells in detail and answer questions that were unexplored in the past. The ability to perform real-time DNA/RNA Sequencing in the field is revolutionizing. There has been progress in the development of software analysis for biological purposes (15). The speed of discovery in the age of big data has reached an unprecedented level thanks to huge technological leaps.

We hope to be a part of the revolution in the future. Looking back on this year, we are excited that Biotechnology Research will continue to grow and be an important part of the journal. The future is bright and the future is huge.

II. MATERIALS AND METHODS

The information presented in this review is the result of extensive literature research in classic books, research articles and consultation with international organisations. SCOPUS, PUBMED, Google Scholar, INFLIBNET etc. data analysis from different databases.

III. RECENT TRENDS IN BIOTECH

Advances in computer technology such as artificial intelligence (AI) and machine learning are accelerating production processes while broadening the scope of biotechnology. In medicine, for example, the ability to analyze large amounts of data helps medicine identify treatments based on the cause of disease. In addition, the innovation in cloud technology is the ability to run software that can be accessed from anywhere and analyze data (6). Biotechnology in the environment - Biotechnology now helps us control environmental pollution by biodegrading harmful chemicals, helping us recycle waste and other waste technologies.

Biotechnology plays an important role in monitoring and preventing degradation through the use of chemicals such as bioremediation, biomonitoring, biotreatment and biodegradation of all carbon monoxide, waste products and fluids. In addition to these benefits, several other biotechnological treatments have been used to monitor various aspects of the environment. Biotechnology in Pharmaceuticals - Biotechnology plays an important role in healthcare. Biotechnology is used in the diagnosis, treatment and prevention of diseases. Biotechnology helps us treat and prevent many diseases; It also helps develop drugs and vaccines that can cure human diseases (6).

IV. APPLICATIONS OF BIOTECHNOLOGY

The use of biotechnology is very wide and affects almost all aspects of human life.

The addition of the word “biology” or “biotechnology” to most future science and technology shows the influence of the science of these disciplines (16). Business, agriculture, environment and medicine are some of the fields where the use of biotechnology has spread. In areas related to living organisms, as well as in all activities where living or biological products are used and product quality is increased, biotechnology can be used(17).

A number of terms have been created.

- **Green Biotechnology:** Technology used in agriculture.
- **Red Biotechnology:** This technology is used for medical purposes.
- **Blue Biotechnology:** This term is used to describe the use of biotechnology in the oceans.
- **White Biotechnology:** This technology is used in industrial processes (18).

There are described below (Demain, 2007). various applications of biotech in the production of products.

V. MEDICAL BIOTECHNOLOGY

Living cells and other cellular compounds are utilized in medical biotechnology to enhance human health. The technology is complex. In essence, biotechnology is utilized for the purpose of discovering ways to cure or prevent diseases. The research aims to utilize scientific methods to find novel or effective techniques for managing human health, identifying illnesses, and comprehending the biology of the human brain (19). Biotechnology in medicine has resulted in significant advancements that have influenced or will influence many different aspects of human life, as evidenced by the following (20).

1. **Genetic Diagnosis and Gene Therapy:** Many scientists refer to this century as the century of genetic engineering. One of the most important progress indicators of our age is genetic engineering, which tries not to limit the living space to its current limits, but to expand its boundaries with other living things. There are new ways to solve problems. Genetic diagnosis is the process of determining the need for genetic disorders and using genetic tests before starting treatment. Depending on the inheritance pattern of the disease, genetic testing is recommended for family members. The type of disease is determined by the results of genetic testing.

   If the disease is caused by a genetic abnormality, it is recommended that other relatives be tested regularly. For the first time in the history of life sciences, new technologies and new ideas are being used as a result of the birth of gene therapy in the 1990s. New windows for understanding major diseases have been opened by the ability to repair and restore abnormal and unhealthy genes in the human brain. War can cause many diseases. Gene therapy is the transfer of genetic material to cells.

   In the future, using different types of genetic analysis to find many important genetic diseases and accurately predict the occurrence of genetic diseases in the womb before and after birth is another way of genetic engineering. There is gene therapy. Many of the limitations of gene therapy have been overcome by scientists. Drug delivery of naked genes to cells and the targeting of cells have made significant progress (21). Gene therapy is currently expensive and requires specialized skills, but will soon be used to treat many diseases.

   There is growing evidence that the use of molecular medicine will reduce medical costs hundreds of times in the future compared to the current situation. One of the most

important and largest biological research projects of our time is the International Human Genome Project. He was able to decipher the human genome and open many peaks. This project is the result of new developments in genetics and the knowledge of scientists, which will bring great benefits and surprises to medical research in the future. The International Human Genome Project is considered a turning point in the history of life sciences (22).

2. **Identification of Molecular Mechanisms of Cancer Genesis:** One of the mysteries of science has been solved with the use of genetic engineering. Scientists have made great strides in using models to determine the cause and stage of cancer over the past two decades. Future cancer treatments will be led by these advances. While no one can predict exactly when the cancer will be defeated, there is hope. In this regard, there are many efforts to use genetics to treat cancer, eg. For example, the transformation of cancer cells into cells has become more common. Replacing faulty or missing genes is one of the strategies for this treatment. American scientists have developed a "smart" virus that can kill cancer cells and allow healthy cells to clean each other, but it does not allow healthy cells to clean each other. Up to 60 percent of cancer cells can be killed with this new method in mouse models. Many pharmaceutical companies around the world are working to develop drugs and treatments to prevent cancer, based on the methods and capabilities of genetic engineering (23). If the principles and methods of genetic engineering and biotechnology are not accepted, these studies will play a role in the treatment of cancer in the future of humanity (24).

3. **Cloning:** Another important topic in genetic engineering and molecular biotechnology studies is the cloning or cloning of cells, which is close to medicine and seems to be the basis for future developments in this field. At this time, similar copies of the original cells are created by the proliferation of the cells of the adult cells. More importantly, the first successful human cloning of an adult animal (Dolly the Sheep) was translocation of the nucleus into the animal cytoplasm in 1996 by Ian Wilmot of the Russell Institute (Edinburgh, Scotland) and colleagues. Oocytes were removed from the nuclei (Figure 2) (25).

Figure 2: The first mammal produced by cloning.

3. **Agricultural Biotechnology:** Many restrictions affect world agriculture and production. These factors include population growth, loss of natural resources, climate change and pests or insects known to kill 25-50% of diseases, or total plant yield or decline (26). The advancement of scientific research in the biotechnology industry in both developed and developing countries shows that biotechnology facilities have received special attention in recent years. Increasing use of biotech to create food security for the population will be a good way to solve poverty and hunger in the future. Since the green revolution and conventional agriculture alone cannot ensure food security and overcome agricultural problems, it would be beneficial to use plant biotechnology to overcome production problems and biotic and abiotic stresses (27).

Genetically modified crops can be used to increase yields or achieve better yields. Transgenic plants can be planted, maintained, and exploited in areas with extreme weather and pests. Pesticides are used to kill pests. toxins remain in the plants in a harsh environment, in addition to the hazardous environment. The transfer of thuringiensis seeds to crops is an example of improved crop resistance. Bt strains are beneficial to pests such as the European corn borer, which is why genetics is used. Scientists detected Bt inbacteria and transferred it to corn, so they could make Bt in plants. The cost of treating the crops with pesticides can be eliminated if maize produces a toxin (Figure 3) (28).

Figure 3: Comparison of corn with Bt protein and natural corn that suffers from perforating pest.

Sometimes, in order to create a plant with good effect, scientists need to find the need of another plant, identify the gene responsible for the good, and insert it into the plant spray genome or cells from which genes are produced. In this case, the protein that produces the desired properties is produced by the transcription of the input gene in the plant cell, and the plant can have both more efficiency and more production before (29). A scientific review explored the use of DNA and protein-based diagnostics in agricultural biotechnology (30).

4. **Industrial Biotechnology:** Biotechnology has many applications, from the creation of cell models to the production of biological products and countless other applications. In recent years, molecular biotechnology has gained a special place in many industries. In some mines in the world, the bioleaching method is used to extract and recover important materials such as gold, silver, copper and uranium (31). The production of special fatty acids and oils for food and detergents, as well as many organic acids such as citric, acetic and lactic acids, is another area of biotechnology. Creation of bio materials, production of renewable energy from biomass, creation and production of nanostructures such as biochips, biochips, and the production of cleaning products, private production of medicines, and use of yeast. The production of bioenzymes for bread, the production of durable textiles for the military, and bio-assisted environmental clean up are all new to the field of biotechnology and have economic and environmental benefits (32).

Lactases can be used in bioremediation to break down plastic waste. The food, tissue, paper and textile industries use this enzyme(33). Table 1 shows the properties of some enzymes.

Enzyme	Industry	Application
Lipases	Food	Increases the taste of cheese (34)
Lipozyme *TL IM*	Food	Transparency of vegetable oil (35)
Amylase	Food/Biofuel	A group of enzymes that break down starch into glucose monomers (36)
Amidase	Chemical	A group of enzymes used to produce pure non-protein amino acids (37)
Laccases	Pulp and paper	Improving the quality of production paper (38)
Cellulase	Biofuel	A group of enzymes that break down cellulose into glucose monomers (39)

Table 1: Some enzymes and their industrial applications.

Wastewater treatment is an important application of biotechnology (40). Biological processes play an important role in removing pollutants (41). Burgess et al. I wrote an article about waste oil treatment. The article reviews advances in odor control(42). It is possible to improve oil recovery and crude oil desulfurization(43). They are Bachmann et al. A review of studies on the use of technology in the oil and gas industry(44).

5. **Marine Biotechnology:** A growing field of technology uses organisms such as fish, algae orbacteria. Marine biotechnology is a type of research that uses aquatic organisms to create new products. The creation of new and improved products is one of the main benefits of marine biotechnology. In addition, marine animals and plants are special compounds with commercial potential in the production of drugs, cosmetics, food products, molecular probes, enzymes, special drug understanding and agricultural drugs (45).There is a handbook of marine macroalgae.The properties, species, production and use of seaweed are presented (46).

New foods containing marine components were reviewed by Freitas and colleagues(47). Algae can be a potential and reliable source of biomass and can be used as a variety of fuels. It can make a variety of fuels (48).

VI. NANOTECHNOLOGY AND MEDICAL BIOTECHNOLOGY

Future developments in medical biotechnology are provided by advances in nanotechnology. Antibiotics are used to reduce the effect of infections on medical equipment. These methods have limitations. It is possible to find the bactericidal activities and habitats of certain animals, plants and insects with the help of Nanotechnology. Spiders, butterfly wings, shark skin, lizard feet, taro and lotus leave provide antiseptic and self-cleaning properties (49). This type of bio-inspiration provides some bio-like objects that can be used to illustrate patterns of knowledge and the connections between knowledge and processes. Medical technology is more useful than biology in guiding the connection between surface models and data.

In biological systems, self-assembly can create elegant systems. The main feature of this system is that both of the compartments have reached. To determine all the functions of complex organisms (plants, animals) and to provide an environment that helps to work on olfaction and biological systems by balancing soft tissues (50). The body's ability to participate in the management of its own body is supported by the components of cells that form the basis for the transport of ion and molecule between cells. Extending the concept of biological inspiration to include the biological identity of nanostructures is very open to the use of nanotechnology. The integration of biofilms into hybrid medical devices that can communicate with the body is an additional aspect. It gives rise to the idea that medical equipment should be integrated with the body (Figure 4). The definition of a system that requires a stable exchange between plant material and the body has been extended. Research on promising treatments and new areas of regenerative medicine will be led by keeping this new concept in mind (51).

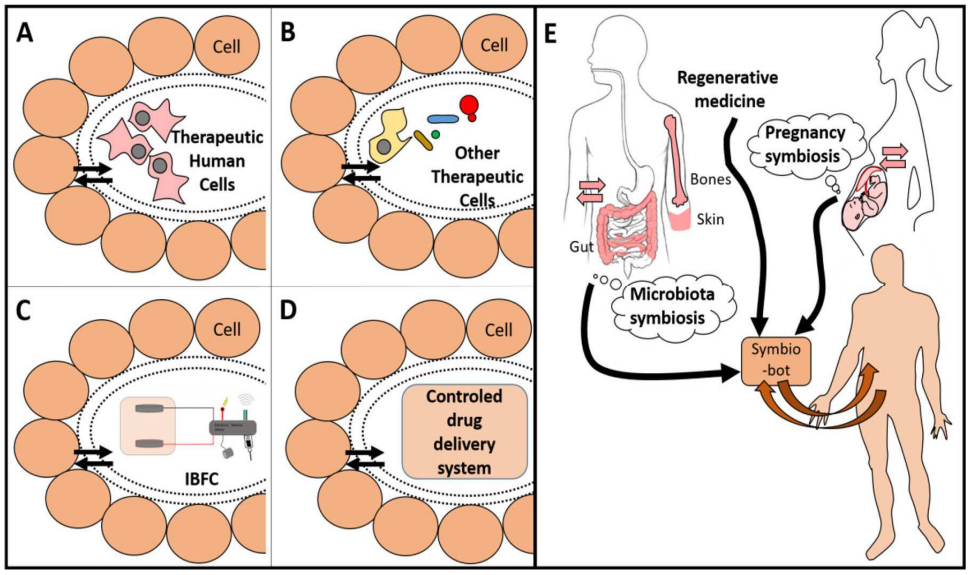

Figure 4. Examples of symbio-bots (A–D) that can be created in a bioinspired way (E).

VII. IMPACTS ON NOVEL BIOTECHNOLOGIES

One of the treatment methods of medicine in the future will be to find drugs that can be used in the treatment of diseases. Doctors and family members get the data from the sensors. 3D printing is now possible thanks to the biotechnology industry. Medical devices, living tissues, cells or drugs will be printed in the future. There is a question of integrity as anyone can copy medicine at home. Problems are created by the continuous development of the pharmaceutical industry.

3D printing can be used to create physical objects and people, but it can also be used to grow biological materials in the lab. An organ is a biological device that is implanted in the body. There is a possibility of sensors that allow rapid diagnosis. The sensors can be accessed from the sphinx. The teeth have sensors that can detect speech and jaw movements. The final solution for building the entire human body will be here soon. Humans are being replaced by computer intelligence in making medical decisions.

VIII. FUTURE SCOPES IN BIOTECHNOLOGY

Biotechnology is a broad field that encompasses many aspects of modern life and offers many opportunities for career and career advancement. This is because of the current need, use and demand for biotechnology. India is a developing country that has become important to the world biotechnology industry. From where? As India has a large pharmaceutical industry linked to the rest of the world, agricultural prosperity produces better crops and a healthcare industry that cannot thrive without agriculture, research and development, growth and biotechnology. Therefore, biotechnology will play an important and important role in terms of employment and job creation in the coming years.

IX. CONCLUSION

Biotechnology is a broad application that enters many industries with the use of science and engineering, and chemical engineering plays an important role in this. Of course, these vehicles are used in medicine, medicine, agriculture, environment, oil and gas, etc. It has many uses in industries. Under these conditions, developing countries have more room for cooperation. However, if the application of this new technology is to improve products for export, the success of some countries may come at the expense of the economy copying the work of others. Adding DNA to the smallest genome is easy to create genetic circuits. This will accelerate the development of genomes for the biorecycling of environmental toxins, the creation of effective drugs and drugs, or the creation of renewable energy. We are looking forward to spreading the important innovations of the future of biotechnology. Looking back on this year, we are excited that Biotechnology Research will continue to grow and be an important part of the journal. The future is bright and the future is huge.

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