A Review paper on the Techniques of Biotechnology

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ABSTRACT: ***Biotechnology is a branch of biology that deals with the use of living systems and organisms in the development of goods. This industry has grown to include innovative and varied research like as recombinant gene technology, genomics, immunology, and the creation of pharmaceutical treatments and diagnostic tests. Biotechnology is a process that involves the use of biological organisms to create or change goods, improve plants and animals, or produce microbes for commercial use. It is research and development in labs using bioinformatics to investigate, extract, utilize, and produce by living organisms and feedstock sources using biochemical engineering with better value-added products. This review paper discusses a variety of techniques used in the area of biotechnology, including tissue culture, PCR, ELISA, western blotting, and so many more. Biotechnology appears to have a promising future. Nanotechnology will transform illness diagnosis in the near future, specifically for diseases driven by genetic factors. The new tests will look for damage to DNA patterns associated to illness risks and estimate the chance of a disease developing. In the future, new drugs will be produced in the healthcare sector to meet our medical needs and battle epidemics.***

KEYWORDS: Biotechnology, Biochemistry, Cells, Microfluidics, Techniques.

1. INTRODUCTION

Biotechnology is a term which refers to the use of various biological organisms and their processes to produce beneficial chemicals or effects in the fields of medicine, agriculture, and industry. This technique has been utilized to finish living cells or parts of living cells in order to create new or improved service based classification[1]. It is the combined use of microbiology, biochemistry, and engineering sciences to achieve innovative approaches to microorganism cultivating cells, tissues, and components. Biotechnology makes use of information from several disciplines such as molecular biology, chemistry, biochemistry, chemical engineering, and digital computers[2]. Number of techniques have been used in biotechnology that includes gene splicing, DNA recombinant, pegylation & bioinformatics also (Figure 1).

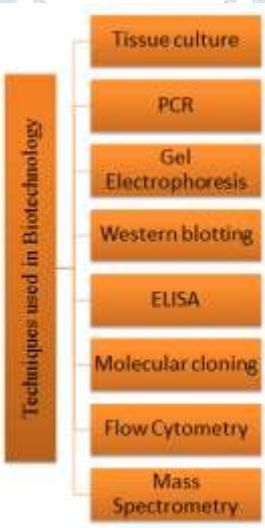

Figure 1: Illustrating The Different Techniques That Used in the Biotechnology Sector.

Biotechnology has shown to be the most significant breakthrough in a variety of sectors. Biology is in the midst of a golden age, with unprecedented opportunities for studying, comprehending, and directing the fundamental processes in plants that benefit humanity[3]. However, biotechnology is being used for the biological processes into the manufacturing of the products that ranges the ancient methods of the alcoholic fermentation towards the recent production of the antibodies and the antibiotics. The rapid growth of the advancements in the current scenario has achieved the understandings of the life processes (Figure 2).

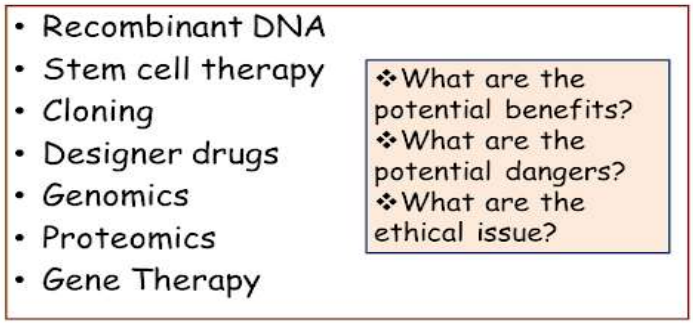

Figure 2: Illustrating The Different Methods That Are Developed in Modern Biotechnology.

1.1.Tissue Culturing:

Tissue culture is among the much broadly utilized technique in any of the biological & biomedical researching labs. It involves the cell growth & the tissues from utilizing the liquid, semi-solid & the solid growth medium like: agar or the broth. This is the most significant tool for studying the biology of the cells by the multicellular organism[4]. Cells are being grown into cultured medium which contains the proper proportion of the required nutrients to cells that have been cultured[5]. Cultures that are growth into single layer of the cells onto glass or the plastic surfaces as the suspension into liquid or the semisolid medium (Figure 3).

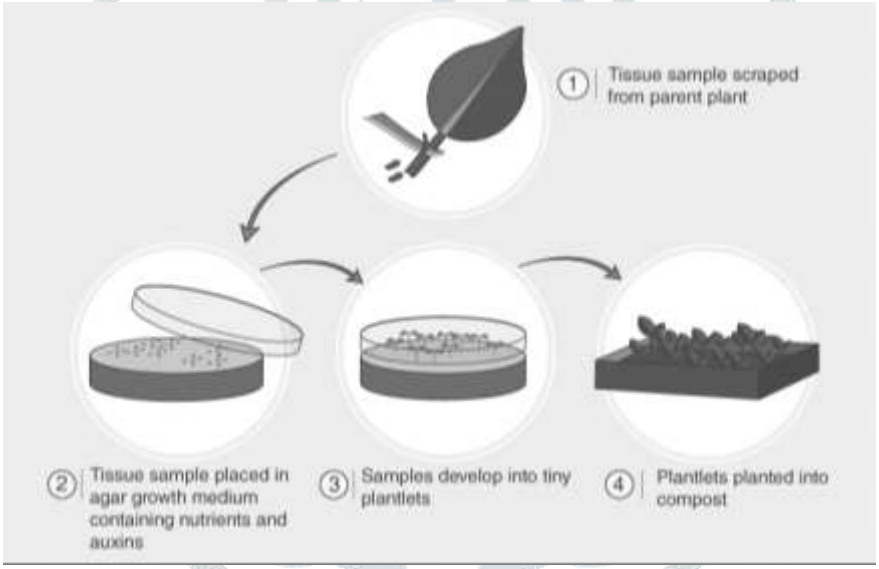

Figure 3: Illustrating The Overview and The Structure of the Plant Tissue Culture with Complete Method.

1.2.Polymerase Chain Reaction:

It is a technique utilized for making the copies of the specific DNA segment in vitro. PCR being applicable towards the number of the fields into modern biology, its medicines & the relating fields[6]. It allowed isolation of the fragments of DNA by the genomic DNA from the selective amplifications over a particular region of the DNA. This facilitated the different processes like: generation of the hybridization probe to the southern hybridization & the northern hybridization (Figure 4).

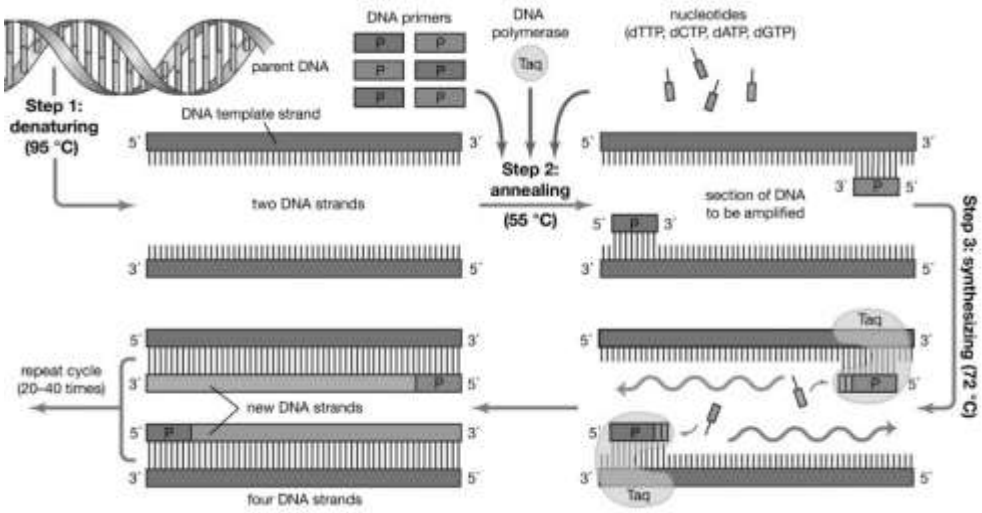

Figure 4: Illustrating the Overview and the Structure of the Polymerase Chain Reaction (PCR).

It's a technique for generating copies of a specific DNA region in a laboratory setting. PCR may be used in a variety of disciplines in contemporary biology, including medicine and related professions. It allowed the genomic DNA to isolate DNA fragments from selective amplifications across a specific area of the DNA.

1.3.Gel Electrophoresis:

Gel electrophoresis is being used as the technique into molecular biology, genetics, biochemistry & the modern biotechnology. This is used for separation of the biological macromolecules as accordance to the electrophoretic motilities. There are around two types of the gel electrophoresis[7]. Into SDS-PAGE, chemical denaturant gets added for removing the structure & turns molecules in unsaturated molecules those having the motilities that depend over the length & the mass to the charge ratio (Figure 5).

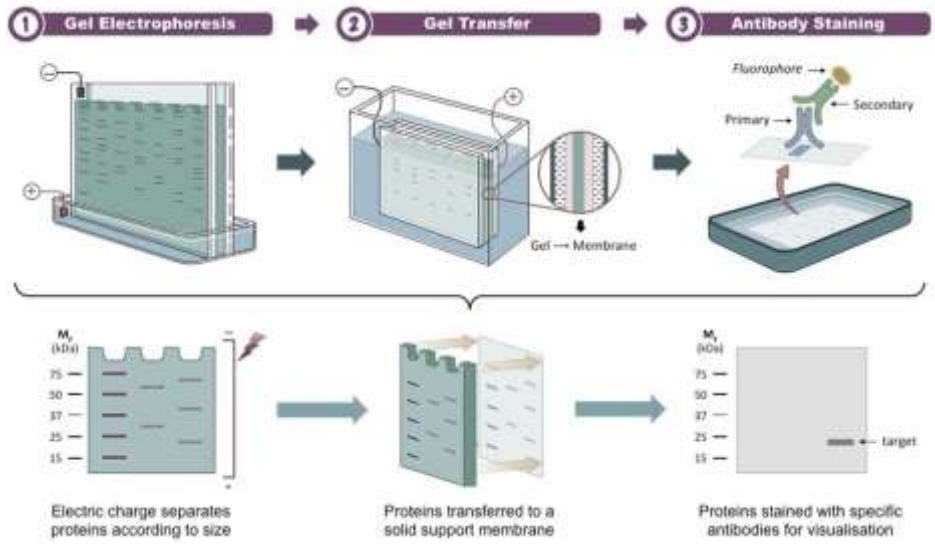

Figure 5: Illustrating the Process of the Gel Electrophoresis as the Technique in Biotechnology

1.4.Western blotting:

This technique is also called the protein immunoblotting which is a popular molecular biology technique use to the detection and the analysis of the proteins that are based upon the ability of binding towards the specific antibody. Western blotting is utilized for proving the various properties of the proteins by the complex mixture of the proteins that gets extracted by the cells that are based upon the molecular weight (Figure 6). This method is also known as protein immunoblotting, and it is a common molecular biology approach for detecting and analyzing proteins based on their capacity to bind to a specific antibody.

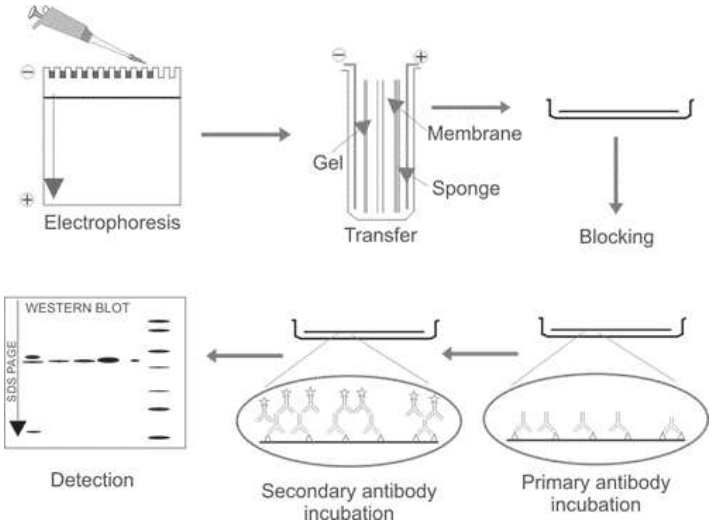

Figure 6: Illustrating The Overview and The Structure of the Western Blotting as The Technique in Biotechnology.

1.5.Enzyme linked immunosorbent Assay Test (ELISA):

ELISA is the most populated format of the wet lab type analytical biochemistry assays which utilizes the solid phase enzymes immunoassay towards the detection of the presence of the substance that may be an antigen, into the liquid sample or the wet samples. The ELISA procedure resulted in the colored end product that correlates the amount of the analytic that is being present into the original samples (Figure 7). ELISA, classic technique of wet lab analytical biochemistry tests, which use a solid material enzyme immunoassay to detect of a chemical, such as an antigen, in a liquid sample or a wet sample. The ELISA method produced a colorful end product that corresponds to the quantity of analytic contained in the original samples.

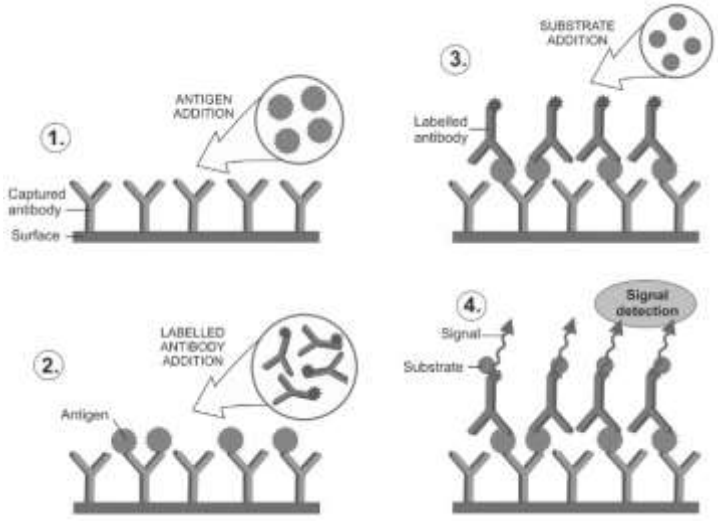

Figure 7: Illustrating The Overview and Structure of Enzyme Linked Immunosorbent Assay Test.

1.6.Molecular or the gene cloning:

It is a gene cloning into molecular biology method which gets utilized for assembling the recombinant DNA molecule & for directing the replication along with the host organism. The DNA is treated then along with the enzymes into test tubes for generating the small DNA fragment. Similarly, the fragments that are combined along with the vector DNA for generating the recombinant DNA molecule (Figure 8). It is a DNA clone into cell biology approach for building recombinant Proteins and controlling replication in conjunction with the host organism. Cutting the necessary DNA segment from surrounding DNA and copying the piece's thousands of times were the procedures used. The microorganism of interest takes hold of the replicated DNA.

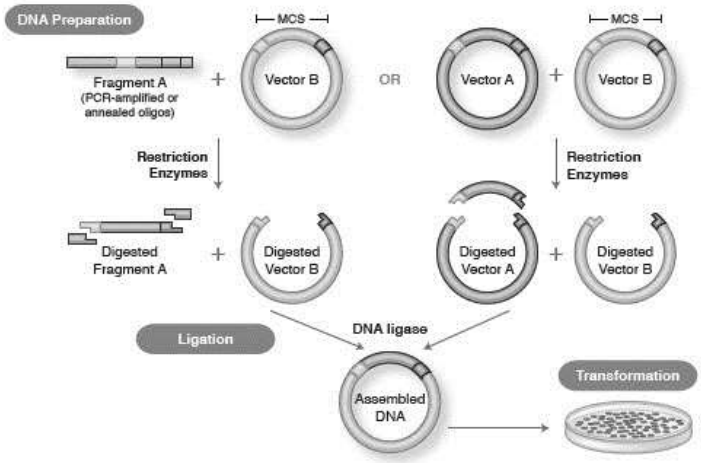

Figure 8: Illustrating The Overview and The Structure of the Molecular or The Gene Cloning.

1.7.Flow cytometry:

It is the most popular method that is being utilized in biotechnology. This is a laser based or the impedance-based method utilized into cell counting, biomarker detections, proteins engineering, cell sorting from the suspending of the cells into steam of the fluid & passing it by an electronically detection instrument. This allowed the investigations of expression of the cells surface & its intracellular molecule characterize & defines the various cells type into heterogeneous population of the cells (Figure 9).

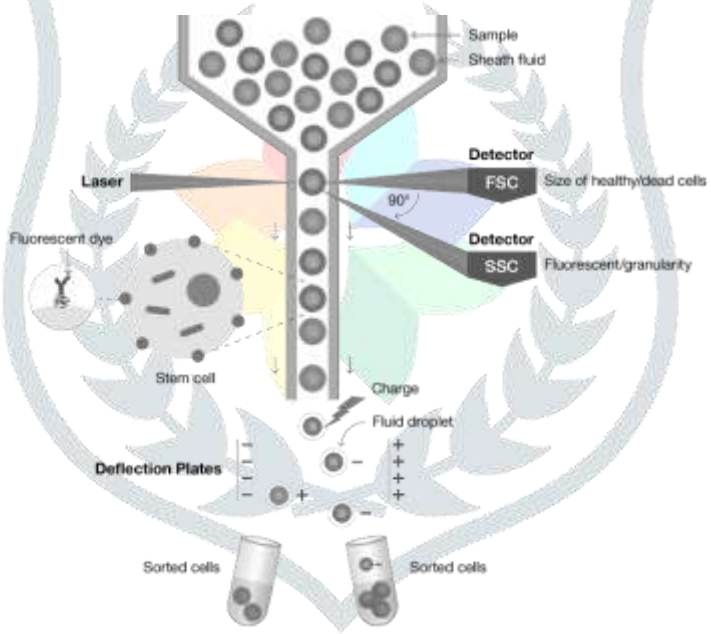

Figure 9: Illustrating The Overview and The Structure of the Flow Cytometry as The Technique in Biotechnology.

2. LITERATURE REVIEW

Richard & Dimitri [8] Studied Biotechnology using microfluidics. Microfluidics allowed biotechnological processes to scale up over physically mechanisms like osmotic movement, electrophoretic mobility, and surface contacts, which were all improved. Microfluidics have been used in DNA analysis procedures and to reduce the time it takes for DNA microarrays to hybridize. The use of microfluidics to protein analysis technology: mass spectroscopy, which allows for the investigation of Pico mole quantities of peptides in a microenvironment.

George et al. studied the Microfluidics enabled nomenclature to be scaled up over physically enhanced processes such as osmotic movement, electrophoresis, and surface interactions. The microscale sample volume and test duration have dropped with time, as have the process costs. The ability of microfluidic devices to be interfaced with existing processes and technology due to their flexibility. The bioprocesses generally are being ill controlled. Hence, the fundamental knowledge for the metabolic interrelations gets limited. Some of the

principles & the on-line capabilities that allowed for judging the importance & the potential to the exploitation that results in the controlled bioprocess into the future[9].

Otto & Wolfgang Gross Microalgae biotechnology was investigated for its useful products. In recent years, this has taken on a lot of significance. The applications include anything from simple biomass generation for food and feed to environmentally friendly uses. Some of these uses are now being developed in the market, and biotechnology applications of microalgae will be expanded in fresh fields. Considering the enormous biodiversity of the microalgae & its recent advancements into the genetic engineering, the groups of the organisms represented the much promising source of the novel products & its applications. Along with the development of the complex cultures & the screening techniques, the microalgae biotechnology already met up with the higher demands of the food & the pharmaceutical industries both[10].

3. DISCUSSION

Engineering and research are also included in this business. Gene editing has assisted in the creation of therapeutic proteins as well as biological organisms. The industrial industry and molecular genetics have benefited greatly from biotechnology. Its reach has been expanded to encompass a variety of biological fields. Bioengineering is a field of biology that focuses on producing useful goods and finding answers to problems. One of the most widely used approaches in genetic engineering is the capacity to modify the DNA of organisms at will. Bioengineering is particularly important in medicine since it enables for the development of therapeutic proteins and other medicines.

4. CONCLUSION

Pharmaceuticals, food, agriculture, and medicine are just a few of the industries where biotechnology is being employed. Pharmaceuticals, agriculture, farming, and medicine are just a few of the businesses and sectors that use biotechnology. This business also includes engineering and research. Pharmaceutical and biological proteins have both benefited from genetic engineering. Bioengineering has had a huge influence on both the industrial and microbiological industries. Its scope has been broadened to include a wide range of biological disciplines. Bioscience is mostly used to produce technology and goods that promote human well-being. Biotechnology looks to be developing rapidly in the future. In the future, nanomaterials will revolutionize disease detection, particularly for diseases based on genetic factors.

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