

A Review on Gene cloning and Genome Organization

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Abstract

Gene cloning (DNA cloning) is nothing but the production of similar or exact copies (clones) of a particular gene or DNA sequence using genetic engineering techniques. In the genetic Engineering techniques the DNA containing the target gene is cut into fragments using restriction enzymes. With the help of the restriction enzymes these fragments are then inserted into cloning vectors, such as bacterial plasmids or bacteriophages, which transfer the recombinant DNA that is desirable gene to suitable host cells, such as the bacterium E. coli where the DNA gets replicated. Alternatively, the complementary DNA is inserted into the vectors, or 'naked' DNA fragments can be taken up directly by a host bacterium from its medium (this is less efficient than vector transfer).

Keywords: Genetics; Gene cloning; Genome Organization

Introduction

Genome organization refers to the sequential arrangement of the genes. Human genomic DNA was first identified in 1869 by the Scientist Friedrich Miescher while investigating for new proteins in the pus of wounded soldiers. Then we noticed that DNA is the genetic material containing all the information essential for life and the basis for heredity. The human genome is divided into 46 DNA molecules, or chromosomes, consisting of pairs of chromosomes 1 to 22 (autosomes), numbered sequentially according to their size, and of two sex chromosomes that determine whether an individual is male or female [1-10].

Human genome is the complete set of nucleic acid sequences encoded as DNA within the 23 chromosome pairs in cell nuclei and in a small DNA molecule found within individual mitochondria. Human genomes include both protein-coding region DNA genes and noncoding DNA. Haploid human genomes, which are contained in germ cells (the egg and sperm gamete cells created in the meiosis phase of sexual reproduction before fertilization creates a zygote), consist of three billion DNA base pairs, while diploid genomes (found in somatic cells) have twice the DNA content. While we can find significant

differences among the genomes of human individuals in the order of 0.1%, these are considerably smaller than the differences between humans and their closest living relatives for example chimpanzees and bonobos [11-20].

Eukaryotic genomes are much more complex than the prokaryotic genomes. And more over, plant genomes are more complex than other eukaryotic genomes. Prior to the development of recombinant DNA technology genomes, the DNA were analysed by re association kinetics techniques. Re association kinetic experiments are performed by melting DNA and allowing it to re-anneal upon itself or with the help of the restriction enzymes or DNA ligases. The kinetics of the re-association provides data that can be used to analyse the overall structure, evolution and expression of genomes [21-35].

People should be educated and obtain knowledge on various functions of the gene cloning and molecular recombination. People can gain awareness through literature, internet sources, family physicians and consultants. **Open access journals** provide more visibility and accessibility to the readers in gaining the required information. The on-going researches all over the world, which are being exhibited through open access journals, serve as the main source of information in various fields.

In order to create awareness among the people, group of researchers and professionals unite to form a **society** or an organization. The main aim of these societies or organizations is to spread the knowledge regarding gene cloning and molecular recombination. Major societies like Genetics Society of Vietnam aims to improve public awareness in genetic related disorders like Down's syndrome. Down's syndrome is a genetic disorder caused when abnormal cell division takes place results in extra genetic material from chromosome 21. Cell and Gene Therapy is being organized by OMICS Group International. OMICS Group International is an amalgamation of Open Access publications and worldwide international science conferences and the scientific events conducted in the field of Genetics. 18th Biotechnology Congress is the leading conference of America going to be held in October 19-20 2017 in USA the main theme of the conference is Novel Insights and Innovations in Biotechnology for Leading a Better Life. Association of Biotechnology and Pharmacy will be useful to form a forum for scientists so that they can bring together to discuss and find scientific solutions to the problems of society. The annual meetings will help the members to share their knowledge and publish their research knowledge particularly by members and fellows of the Association and special care will be taken to provide an opportunity for young scientists [35-50].

Open Access literature plays a key role in providing the information and current researches across the globe. Journal of Molecular and Genetic Medicine provides information on latest technologies related to molecular medicine and genetic medicine and also many conferences like Clinical and Medical Genetics organized by OMICS the main theme of the conference Current Advancements and Novel Research on Clinical and Medical genetics.

Journal of Molecular Biomarkers & Diagnosis Journal studies improve the knowledge and provide cutting-edge research strategies for the development of new therapeutics Molecular Biology: Open Access is a leading provider of information on genetics and Molecular biology and novel strategies to be followed. The above mentioned Open access journals on Genomics are the peer-reviewed journals that maintain the quality and standard of the journal content, reviewer's agreement and respective editor's acceptance in order to publish an article. These journals ensures the barrier-free distribution of its content through online open access and thus helps in improving the citations for authors and attaining good journal impact factors.

Gene Cloning Vectors

A cloning vector is a small piece of DNA which is taken from a virus, a plasmid, or the cell of a higher organism, that can be stably maintained in an organism, and into which a foreign DNA fragment can be inserted into it for the cloning purposes. The vector therefore contains features that allow for the convenient insertion or removal of DNA fragment in or out of the vector, for example by treating the vector and the foreign DNA with a restriction enzyme that cuts the DNA. DNA fragments

thus generated contain either blunt ends known as sticky ends, and vector DNA or foreign DNA with compatible ends can then be joined together by ligation. After a DNA fragment has been cloned into a cloning vector, it may be further sub cloned into another vector designed for more specific use [7-90].

Plasmids have the characteristic of replicating circular extra-chromosomal DNA. They are the standard cloning vectors generally plasmids may be used to clone DNA insert of up to 15 kb in size. The most commonly used cloning vectors are the pBR322 plasmid. Kurcheti Pani Prasad clearly explained the role of microbiology in the article entitled Role of Plasmids in Microbiology. Other cloning vectors include the pUC series of plasmids, and a large number of different cloning plasmid vectors are available. Many plasmids have higher number of copies for example pUC19 which has a copy number of 500-700 copies per cell, and high copy number is useful as it produces greater yield of recombinant plasmid for subsequent manipulation. However low-copy-number plasmids may be preferably used in certain circumstances, for example, when the protein from the cloned gene is toxic to the cells [51-80].

Bacteriophages are one type of cloning vectors for examples phage λ and M13 phage. Grigol Abramia clearly explained the role of the plasmids in the Bacteriophages against Antibiotic Resistant Salmonella Bacteria for the Possible Prevention and Treatment of Birds and Clean Up of their Water Habitats of. The amount of DNA that can be packed into a phage can be a maximum of 53 kb, therefore to allow foreign DNA to be inserted into phage DNA, cloning vectors may need to have some non-essential genes deleted, and for example the genes for lysogeny since using phage λ as a cloning vector involve s only the lytic cycle. There are two kinds of λ phage vectors - insertion vector and replacement vector. Nucleic Acids, Molecular Biology & Molecular Medicine (10 Plenary Forums - 1 Event) the conference going to be held in USA the main theme of the conference is Explore the science of Nucleic Acids.

Apart from the articles, presentation at conferences, symposiums, workshops also yield a better exposure to health information and advanced technologies that are being invented in the present generation. In the [Genetic and Protein Engineering](#) (10 Plenary Forums - 1 Event) main theme of the conference is Protein Engineering: Exploring the patterns of life, where the renowned speakers are going to discuss on the Genetic and protein engineering [81-90].

Novel Technologies in Genetics

Several discoveries have made genetic research one of the fastest developing research areas in the world today. With the knowledge of genetic basis of disease there is a rapid development of genetic basis for disease risk and diagnosis and treatment. Genetic engineering has also made progress over the last few decades [91-99].

Conclusion

DNA is used for research in the laboratory. Restriction enzymes are a commonly used enzyme that cut DNA at specific sequences and these sequences can be visualized under the gel electrophoresis. The DNA can then be amplified, modified or cut into pieces for research using sophisticated technology. DNA can be amplified using a procedure called the polymerase chain reaction (PCR).

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