ETHIOPIAN INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

eISSN: 2349-5715 pISSN: 2349-5707

Volume: 11, Issue 04, April-2024 SJIF 2019: 4.702 2020: 4.737 2021: 5.071 2022: 4.919 2023: 6.980 2024: 7,662

THE EMERGENCE OF MOLECULAR BIOLOGY

Qosimov A

Andijan State Medical Institute

Abstract: The field of atomic science has without a doubt changed how we might interpret the key components that oversee the living scene. Rising up out of the union of different logical disciplines, including hereditary qualities, organic chemistry, and biophysics, sub-atomic science has turned into a foundation of present-day science, giving significant experiences into the mind-boggling operations of cells and the perplexing cycles that support life. This article will dig into the authentic turn of events, key disclosures, and the extensive ramifications of this dynamic and always developing field.

Keywords:molecular biology, science and innovations, new methods, medical stuff, different operations.

Introduction: Embryonic developments in studies of DNA chemistry and cellular molecular structure were beginning to cast new light on these problems when they were prematurely integrated into fixed conceptual systems whose only real merits were their internal consistency. Considerable though this past progress has been, it has all too often led to the reworking of isolated genetic problems in terms of new or slightly modified conceptual frameworks, and it has produced no genetic scheme of wide application with predictive power. With the current explosive growth of molecular biology, this situation is rapidly changing. Molecular genetics which have found its organism and its general theory has opened a new domain to genetics proper and has clarified gene central role in sundry fields of biology.

An understanding of the coding mechanism using simple base sequence led to models that invoked changes in the identities of individual amino acid residues in proteins, but these did not put an intelligible genetic model for gene function at the disposal of the working geneticist. The dualistic theory of gene structure as a simple code for an inflexible protein was hard-pressed to explain a bewildering array of genetic data. In the 1940s and 1950s, early studies in molecular genetics postulated that it would not be easy to decipher the genetic program in terms of specific gene products and that genes themselves might have only a relative existence. This work was beginning to clash with a new molecular knowledge of diverse proteins and their metabolic roles and with a renaissance in studies of gene function using the newer findings in microbial genetics. All too often, gene mapping experiments did not give expected results, and there were many cases of irreconcilable genetic and biochemically metabolic results for the same gene.

In the early part of this century, classical genetics, cytology, biochemistry, and evolutionary theory were integrated with admirable success. This approach yielded an understanding of basic genetics, mutation, and the structure and function of genes and chromosomes. DNA structure, as conceived of by the early pioneers in the field, suggested genetic mechanisms that involved only changes in the identities and connections of nucleic acid bases. In terms of known chemistry, this was modification in a linear, one-dimensional array and it did not yet point to a molecular hereditary mechanism markedly different from the then current idea of genes as mutable protein catalysts for specific chemical reactions.

Definition of Molecular Biology

eISSN: 2349-5715 pISSN: 2349-5707
Volume: 11, Issue 04, April-2024 SJIF 2019: 4.702 2020: 4.737 2021: 5.071 2022: 4.919 2023: 6.980 2024: 7,662

Molecular biology tells us the living world is constructed from nucleic acid and proteins; thus, it is necessary to understand the chemical nature and specific interactions of biological molecules. The function and structure activities of each living cell are mainly concerned with the functioning and organization of different molecules. The key point is to understand the expression of genetic information of nucleic acid and the transfer of genetic information. The genetic code is transferred from nucleic acid to protein by molecular biology. The gene concept has high importance in understanding life. The gene is a part of DNA with certain information for protein and polypeptide. The gene concept can be analyzed by mutation and is expressed through a specific function of protein. High mutation rate caused by destructive factors can lead to changes in living organisms and it can give insights into evolution. This shows that modern biological research has a tight correlation with molecular biology and the depth of understanding in each discipline depends on understanding molecular biology.

Molecular biology is a study of the science molecular basis of biological activity. Molecular biology mainly focuses on the various cellular systems, especially DNA, RNA, protein synthesis, and learning how these activities are regulated. The research and testing methods of molecular biology have a big influence on genetic engineering. By thoroughly understanding how cells work, genetic manipulation has led to products that are produced more efficiently. For instance, a pharmaceutical product, antibiotics, or various food and agricultural products. Through molecular biology, scientists have been able to modify an organism's own DNA in order to produce beneficial products. This is another area where the implications of molecular biology are vast. Genetically modified products offer many solutions to treating diseases because the understanding of DNA molecular biology may be the key to curing various diseases. Molecular biology has helped increase the production of medicine. Medicine has always been a field that has profited from natural elements. Through isolating DNA, scientists may produce treatment for diseases that use the body's own systems.

Historical Background

Genetic information was first appreciated when Gregor Mendel experimented with inheritance patterns of certain traits in pea plants in 1866. A molecule called deoxyribonucleic acid (DNA) was later discovered as the carrier of genetic information. This led to one of the most significant scientific discoveries of all time by James Watson and Francis Crick, who in 1953 discovered the structure of DNA. The understanding of DNA at the molecular level provided a foundation for the principle and the practical construction of biological systems of DNA replication, transcription, and expression. These systems have been both further understood and manipulated with the invention of genetic engineering and its associated molecular biology techniques. The molecular biology techniques and discoveries were greatly reliant on the supply of a variety of enzymes, many of which are isolated from bacteria. This later formed an important part of molecular biology in the study of prokaryotic organisms. Since the discovery of DNA, molecular biology has been a crucial part of many biological experiments and has led to various high-throughput and efficient methods.

The first protein was sequenced and the gene was synthesized in the same year. This was a groundbreaking method that has led to efficient study of genes and proteins. It was not until the 1970s that molecular biology was primarily involved with molecular genetic research, mainly due to the development of recombinant DNA technology. This technology enabled isolation, manipulation, and re-introduction of DNA segments. DNA cloning and gene cloning were introduced, which allowed for generation of recombinant DNA, the study of specific gene expression, and protein

eISSN: 2349-5715 pISSN: 2349-5707
Volume: 11, Issue 04, April-2024 SJIF 2019: 4.702 2020: 4.737 2021: 5.071 2022: 4.919 2023: 6.980 2024: 7,662

synthesis. The study of the regulation of gene expression has been a key theme in molecular biology since 1980. This has led to an understanding of the cell cycle and its regulation, which has formed the basics for cancer research. The mid-1980s has seen abundant amounts of research in various fields of molecular biology and it is highly regarded as the peak of the golden era of molecular biology.

Importance of Molecular Biology

Molecular biology is the study of biomolecules at the intracellular level. While we may define it more specifically later on, it's important to address the general idea of molecular biology. This idea is that now we are looking at things at the most basic and rudimentary level. It is the theory that all sciences lean on, that to fully understand something we must understand how it was made (to understand faults in your car, you have to understand how cars are made). The belief is that the only way to fully understand any living system is at the molecular level. Thus, the importance of molecular biology. Today, with the study of genetics, it is this idea that is being utilized. The belief that by manipulating the genetic code of an organism, we can learn how it works, as the genetic code is what makes an organism what it is. This is best exemplified by the Human Genome Project, which at its core is an exercise to fully understand what makes a human being.

Why is this study so important, and who does it really affect? At first glance, it may seem that molecular biology is exclusively for the biochemist, and the rewards of such study take extensive lengths of time. This is partially true. Much of the technology and theory in molecular biology is quite recent, and as it deals with something as complex as life, results do take a long time. But consider modern medicine. In present-day society, we are used to medicine solving problems quickly and effectively, and often times cures are expected instantly. Unfortunately, this simply isn't the case for all diseases and sickness, and in some cases, problems aren't solved at all! This is something we can't accept as a society, and is why molecular biology affects every one of us.

It is fascinating to take note of that around then science and, specifically, organic chemistry were not yet prepared to partake in this recently arising field, which would later become known as sub-atomic science. The transcendent comprehension of science was focused on different perspectives; it had arrived at another top as an examination field and everyone was persuaded that what was in store had a place with science. The principal laws of mass activity and thermodynamics were laid out and determinedly secured in each scientist. The particularity of natural substances was very much made sense of by stoichiometry and the steric plan of molecules. This information brought about numerous significant revelations and items — like composts, pesticides, plastics and explosives — with a tremendous effect on society, farming, medication, purchaser items and the military, to give some examples. Science was then overwhelmingly centered around blending new atoms; natural polymers hence had minimal opportunity to be perceived as the moderate transporter of hereditary data. The comprehension of the job of proteins as an impetus of substance responses upheld this overall conviction; the list of distinguished and described catalysts developed day to day and led to a happiness similar with that of the prime of genomics.

As organic macromolecules — nucleic acids and proteins — turned into the subject of examination, sub-atomic science and natural chemistry tracked down a shared factor. Presently, the natural chemists stood sincerely behind 'atomic science', recently characterized as the organic chemistry connected with DNA and its appearance into proteins, and zeroed they would say on researching how hereditary data is put away, sent and converted into aggregates. Natural chemists

eISSN: 2349-5715 pISSN: 2349-5707

Volume: 11, Issue 04, April-2024 SJIF 2019: 4.702 2020: 4.737 2021: 5.071 2022: 4.919 2023: 6.980 2024: 7,662

had long figured out how to analyze responses by separating them into the littlest individual strides in synthetic terms. Under given conditions, for example, pH, temperature and salt fixations, these rudimentary advances are totally reproducible. Known as 'Descartes' precision', such a one-layered, direct chain of rudimentary advances driving from cause to impact was from now onward, indefinitely quite a while the essential comprehension of specialized and logical cycles, including natural ones. As the name demonstrates, Descartes involved the mechanical clock as a model in which each machine gear-piece prompts the development of the following in a reproducible and unsurprising manner. This model is as yet appropriate to most of biochemical responses. This reductionist way to deal with sub-atomic science ended up finding success at first and assisted with disentangling a large number of the essential sub-atomic and cell processes. Nonetheless, a few researcher began acknowledging very early that the enormous intricacy of living organic entities couldn't be made sense of exclusively based on a perfect timing component.

Conclusion: The rise of sub-atomic science has been a groundbreaking excursion in the comprehension of life, with extensive ramifications across different logical disciplines. From the clarification of the hereditary code to the advancement of bleeding edge biotechnological applications, the field of sub-atomic science has consistently pushed the limits of logical information and our capacity to outfit the force of living frameworks. As we keep on digging further into the mind-boggling activities of cells and life forms, the fate of atomic science holds the commitment of much additional momentous revelations and creative answers for the difficulties confronting humankind.

References:

1. Avery OT, MacLeod CM, McCarthy M (1944) Studies on the chemical nature of the substance inducing transformation of pneumococcal types. J Exp Med 79: 137–158
2. Ellis EL, Delbrück M (1939) The growth of bacteriophage. J Gen Physio 22: 365–384
3. Gamow G (1954) Possible relation between deoxyribonucleic acid and protein structures. Nature 173: 318
4. Gibbs WW (2003) The unseen genome: gems among the junk. Sci Am 289: 46–53
5. Hershey AD, Chase M (1951) Independent functions of viral protein and nucleic acid in the growth of bacteriophage. J Gen Physio 36: 35–56
6. Kellenberger E (1995) History of phage research as viewed by a European. FEMS Microbial Rev 17: 7–24
7. Beutler, M., Homann, A. R., Mihalic, M., Plesnik, S., Niebling, L., Eckart, M., ... & Hoffmann, H. (2021). Rapid tuberculosis diagnostics including molecular first-and second-line resistance testing based on a novel microfluidic DNA extraction cartridge. The Journal of Molecular Diagnostics, 23(5), 643-650.
8. Saifutdinov, Z. (2021). Molecular Determinants of Isoniazid Drug Resistance Mycobacterium tuberculosis. EC Pulmonology and Respiratory Medicine, 10, 63-68.