ANIL AGGRAWAL'S
Internet Journal of
Forensic Medicine and Toxicology
The world's first online journal devoted entirely to forensic medicine and toxicology · Published 1 January and 1 July

VOL. 12, NO. 1
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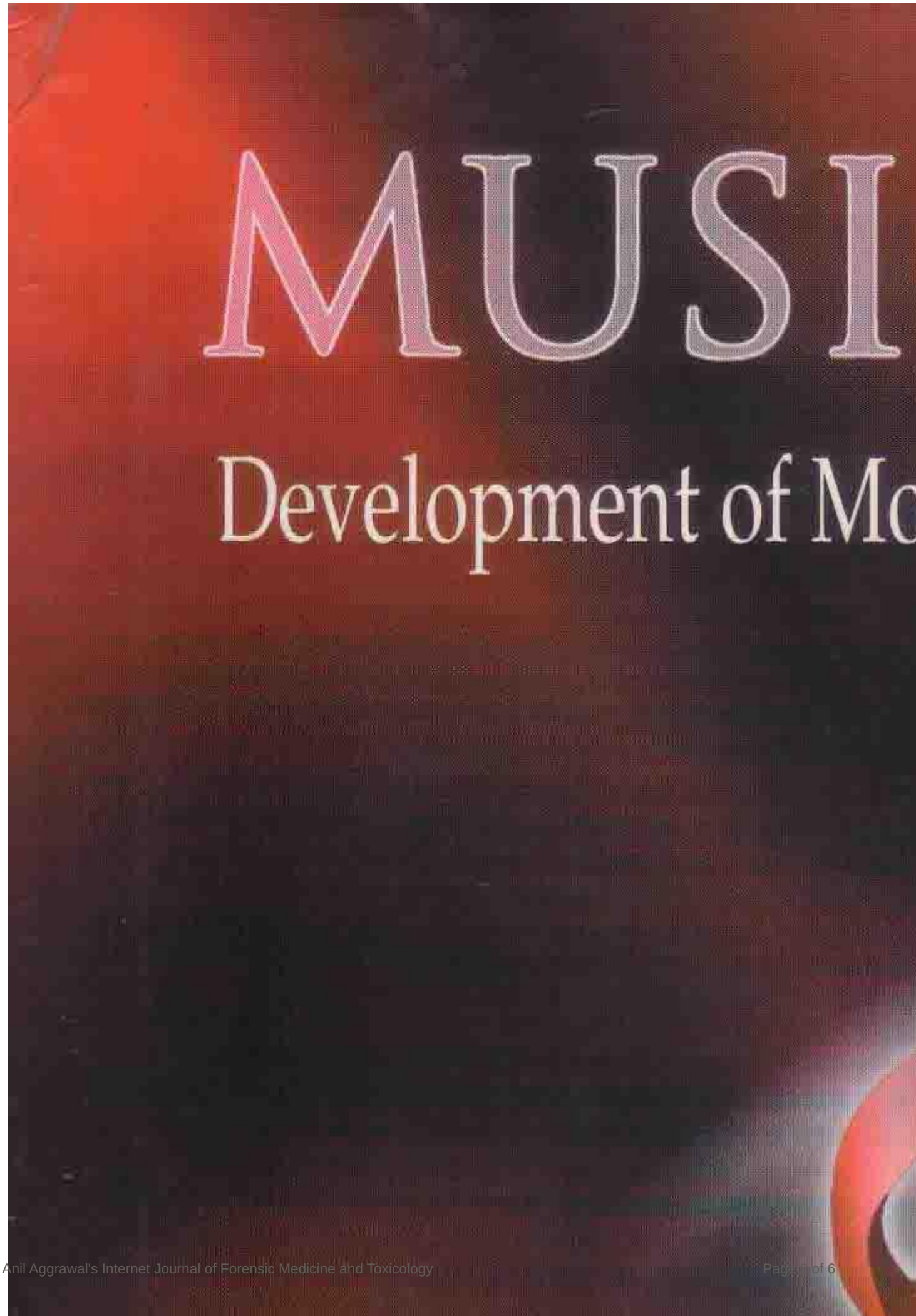
Book Reviews: Popular Books Section



...AN EXCELLENT READ ...Although quite exhaustive in content and punctuated with some interesting anecdotes, Music of Life reads more like a scholarly book for graduate or postgraduate level than a popular exposition of the subject. Students doing courses in molecular biology would find it useful, but the general reader may find it too difficult to grasp...

Music of Life: Development of Molecular Biology – A Personal Account *by* D.P. Burma. Hardcover, 9.5" x 6.3" x 0.9".
Vigyan Prasar, A-50, Institutional Area, Sector 62, Noida – 201307 (U.P.), India. Publication Date 2004. xxvi + 242 pages, ISBN: 81-7480-106-5 , Price 150s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Molecular biology exploded into the world of life sciences soon after the discovery by James Watson and Francis Crick of the double-helical structure of DNA and the enunciation of the ‘central dogma' according to which DNA guided protein synthesis via RNA (DNA ® RNA ® Protein). The author, a noted biochemist, had the good fortune of being either an eyewitness of, or a direct or indirect participant in some of the major developments in the field of molecular biology some of which are narrated in the book.

Although trained as a physical chemist, the author's attention was first drawn to Watson and Crick's historic paper on DNA structure in *Nature* in April 1953 by the noted physicist D.M. Bose, the then Director of Bose Institute, Kolkata, who wanted to know more about the nature of ‘gene'. The author's first encounter with nucleic acids in laboratory came in the early 1950s when a sample of ‘yeast nucleic acid', was brought to him for electrophoresis. In those days only two types of nucleic acids were known – thymus nucleic acid and yeast nucleic acid. Thymus nucleic acid was basically DNA while the latter contained mostly transfer RNA. It was this apparently insignificant event that made the author switch over to biological sciences from physical sciences.

The book primarily recounts the history of molecular biology as it developed through the second half of the 20th century. The opening chapter recounts the works of the early scientists like Gregor Mendel, William Bateson, Oswald T. Avery, A.D. Hershey, and others that preceded and led to Watson and Crick's work on DNA, which really brought DNA to the limelight. But the discovery of nucleic acids, particularly DNA, dates back to 1858, almost a hundred years before the structure of DNA was proposed by Watson and Crick in 1953. Also, DNA was established as the genetic material by Avery and his colleagues in 1944, years before Watson and Crick's work. The structural features of DNA and their functional implications, especially duplication during reproduction, are also discussed.

The second chapter deals with the synthesis of proteins. “If we accept that DNA plays the music of life,” says the author, “the question arises, how is the music created?” He describes the coordinated expression of the innumerable functions of the living entities, responsible for their maintenance, reproduction, and genetically programmed death as the ‘music'. He then goes on to narrate the history of understanding of the complicated machinery of the living cell in quite some detail. There is detailed discussion on amino acids, the building blocks of proteins, and on the structure of proteins and ribosomes, the sites of protein synthesis.

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The genetic code and messenger RNA form the topics of discussion in the third chapter titled ‘Notation of the Music'. “It will soon be clear that just as man-made music is written in musical notation,” he writes, “the music of life is written in coded form in DNA. Before playing the music the coded message has to be transcribed in a tape made of RNA, which is rightly called the messenger RNA.” Here we also find accounts of the author's personal interaction with stalwarts like Arthur Kornberg and Joshua Lederberg during their visits to Kolkata, and his joining the laboratory of Nobel laureate Severo Ochoa to work on enzymes.

…It was the time when a race was on to unravel the genetic code. There are 20 amino acids and there ought to be a code for each amino acid and the race was on to find them. Meanwhile, Crick had published a paper in Nature on triplet code. As codes of different amino acids were becoming clearer, Har Govind Khorana stepped in…

It was the time when a race was on to unravel the genetic code. There are 20 amino acids and there ought to be a code for each amino acid and the race was on to find them. Meanwhile, Crick had published a paper in *Nature* on triplet code. As codes of different amino acids were becoming clearer, Har Govind Khorana stepped in. He was able to perfect the coupled chemical and biochemical methods to synthesise stretches of DNA and RNA of desired length and sequence of bases, as required. It was a remarkable achievement, which made it possible to understand the genetic code without any ambiguity. Nirenberg and Khorana shared the Nobel Prize in 1968.

The fourth chapter is devoted to ribosome, which the author calls the ‘musical instrument'. Ribosome is a ubiquitous organelle present in each and every living system – be it an animal, a plant, or microorganism. Without ribosomes cells cannot synthesise proteins. The details of the operation of the ribosome, in which the author himself was involved to some extent, are elaborated in this chapter. The three steps of protein synthesis – initiation, elongation, and termination – are described in some detail.

Although in the early years of molecular biology DNA was considered the master molecule of life – the ‘master musician' creating the music of life – it was later realised that RNA sometimes acts as the master, at least in some viruses that have RNA as the genetic material. According to the author, a majority of molecular biologists today believe that the RNA world preceded the DNA world, as originally suggested by the Nobel Prize-winning physicist Walter Gilbert. One of the strongest evidence of this, the author feels, is that DNA cannot be synthesised without the help of RNA and its ingredients. In the fifth chapter the author presents evidence in favour of RNA preceding DNA as the original player. RNA has been found not only to be involved in the synthesis of DNA but also to act like enzymes, which were always thought to be proteins.

…Chapter six is titled “When the tune goes wrong”. It is about certain genes that are supposed to trigger the conversion of normal, healthy cells into fast-growing cancer cells. The cause and effect relations in the induction of cancer at the genetic level are discussed at length including the effect of various cancer causing agents – chemicals, radiation, and viruses…
Chapter six is titled “When the tune goes wrong”. It is about certain genes that are supposed to trigger the conversion of normal, healthy cells into fast-growing cancer cells. The cause and effect relations in the induction of cancer at the genetic level are discussed at length including the effect of various cancer causing agents – chemicals, radiation, and viruses. The study of viral genes responsible for the production of cancer has led to the discovery ‘oncogenes'. Later, they were shown to be present in a slightly variant form in mammalian cells as well. There is also a brief discussion on the various approaches to cancer therapy.

The last chapter, titled “ Darwin 's flute” is primarily about Darwin 's sea voyage on board the *HMS Beagle* and his subsequent development of the theory of evolution, as elaborated in his *Origin of Species* , which the author says “is the gospel truth and has been thoroughly vindicated by the knowledge acquired subsequent to his death.”

"The main object of this last chapter," says the author “is to show how DNA has been used as a molecular marker to strengthen what has been learnt through the painstaking efforts of the classical biologists. Darwin 's flute plays the music of life through molecular biology.”

Although quite exhaustive in content and punctuated with some interesting anecdotes, *Music of Life* reads more like a scholarly book for graduate or postgraduate level than a popular exposition of

the subject. Students doing courses in molecular biology would find it useful, but the general reader may find it too difficult to grasp.

-Biman Basu



-Biman Basu
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