THE DISCOVERY OF DNA

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In the realm of science only few molecules have caught the imagination of mankind. Examples are Kekule's benzene and the description of DNA by Watson and Crick. The discovery of the structure of benzene spawned the industrial revolution in the late nineteenth and twentieth century with the birth of the organic chemical industry. The discovery of DNA led to the birth of a new science and technology. DNA has challenged scientists, has inspired artists and profoundly transformed the society we live in.

A defining moment in the history of DNA was a one page paper in Nature dated April 25, 1953 by Watson and Crick who described on entwined embrace of two ribbons of DNA. This structure depicted in the form of a carbon was a triumph of intuition rather than experiments. It was a proof of the supreme law of the universe, that nature abhors complexity and the absolute truth is always elegantly simple. Yet this simple description of the structure of DNA provided the foundation of modern biology and led to an understanding of molecular damage and repair, replication and inheritance and the diversity and evolution of species. The penultimate paragraph of this paper gave a clue of what was yet to unfold. It states "It has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material".

My own first introduction to the DNA was in 1968. In the summer of 1968, I brought a book called "The Double Helix" by J.D. Watson. It was a most enticing account of a scientific discovery, somewhat sensationalized, yet a most absorbing account of an epoch making discovery. It had a flavor of a travelogue, intrigue of a detective novel and the treachery one often encounters in historical novels. There was another epoch making event in 1968, which for the first time demonstrated the key role of chemistry in modern biology, the Nobel prize for medicine to Har Gobind Khorana, Marshall Nirenberg and Robert Holley for their unambiguous identification of the 64 possible combination of triplet codes (codons) of the four bases present in DNA and messenger RNA which ultimately make up the genetic code.

The story of DNA is also a story of intrigue in science. There is still a controversy as to how the x-ray photographs of DNA by Rosalind Franklin was clandestinely passed on to Watson and Crick by Maurice Wilkins, the need to keep the strands of thinking at Cavendish Laboratory a secret from Linus Pauling, whose son was also at Cambridge at the same time and the glaring omission of the work by Overy, Macleod and McCarty

published in J. Expt Medicine, in 1944 in the citation to the nature paper by Watson and Crick. It was McCarty who first proved that DNA was the material of inheritance and that virulence of a bacterial agent of pneumonia could be transferred to a non-infectious bacterium with pure DNA. McCarty termed DNA as the “transforming principle” which are “functionally active in determining the biochemical activities and specific characteristic of cells”.

The discovery of double helix was just a beginning. Soon we learnt how DNA regulates cell growth deciphered the genetic code, which in turn led to the discovery of restriction enzymes that could splice genes. This opened up a whole new world of recombinant DNA technology. The rest, of course, is history.

Even then man has taken only the first tentative steps in his quest for the understanding the book of life. The alphabets of life has just been read. The words and sentences are yet to be deciphered, much less understood. One can say with certainty that by the time world celebrates the centenary of the discovery of DNA we would have unraveled several paragraphs in the book of life.