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Heroes of Science and Technology



**Francis Harry Compton Crick:
The Discovery of the DNA Double
Helix**

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Biography

Francis Harry Compton Crick was born on June 8th 1916 and was raised in Weston Favell, Northampton, England, where his father and Uncle owned and ran the local boot and shoe factory. He was the eldest of 3 children to Harry Crick and Annie Elizabeth Wilkins.



He was educated at Northampton Grammar School and Mill Hill School in London and went on to study Physics at University College London. After 4 years of hard work and studying he achieved his goal and was awarded a BSc in 1937. With his BSc achieved Crick went on to study for a Ph.D. in physics but unfortunately his studies were interrupted by the outbreak of World War Two. During the War in replacement of his lost studies Crick joined the British Admiralty Research Laboratory where he worked as a physicist, in the development of magnetic mines for use in naval warfare. It was here that Crick furthered his interest in science and continued his work at the Laboratory until 1947. He then moved to Cambridge and started work studying the physical properties of cytoplasm in cultured fibroblast cells at the Strangeways Laboratory.



After two years working at Strangeways he decided to move to the Medical Research Unit at the Cavendish Laboratory. It was here that Crick began to study X-ray crystallography along side a team led by Max Perutz. The work with the Max Perutz team inspired Crick to further his education and in 1950 he became a student for the second time. This time he attended Caius College, Cambridge, and worked towards a Ph.D.

In 1951 James D Watson, an American Biologist, came to the laboratory. Both men immediately knew that they shared the same interests in biology and through this became great friends. Alongside his studies at Caius College, Crick decided to work with

Watson in order to further their understanding and put their knowledge forward to eventually aid him in achieving his Ph.D. This also allowed them to learn more about their most sought after aspect in biology, how molecules make the transition from non-living to living. At the end of 1952 Crick and Watson came up with a structure for DNA, it was a double-helical shape with a base replication scheme.

In 1953 Crick took a leave of absence from the Laboratory to go over to America where he worked at the protein structure in a laboratory in Brooklyn. He also took some lectures at Harvard University, as a visiting professor. On his return in 1954 Crick completed his studies and obtained a Ph.D. on the theory entitled "X-ray diffraction: Polypeptides and proteins".

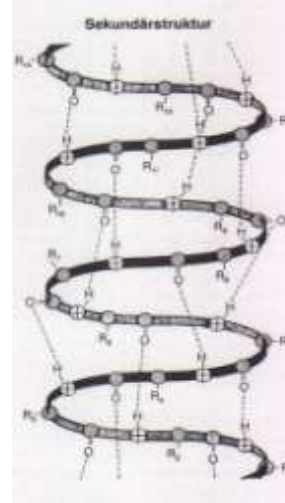
In the years following, Crick concentrated most of his work on Biochemistry and Genetics, leading his ideas towards protein synthesis and the Genetic code. In 1960 he was awarded the Prix Charles Leopold and in 1962 was awarded the Merit of Gairdner Foundation. In 1962 alongside James D Watson he was awarded the Nobel Prize for his "discoveries concerning the molecular structure of nucleic acid and its significance for information transfer in living materials".

For the rest of his career Crick continued to study his passion and wrote many books explaining his research and discoveries. After retiring he spent many years of happiness with his second wife, Odile Speed, and their two daughters, Gabrielle and Jacqueline Crick. He also had a son, Michael Crick, from his first marriage to Ruth Doreen Dodd. Sadly in July 2004, at the age of 88, Crick Died of Colon Cancer leaving a trail of research that is continuously studied in modern biology.

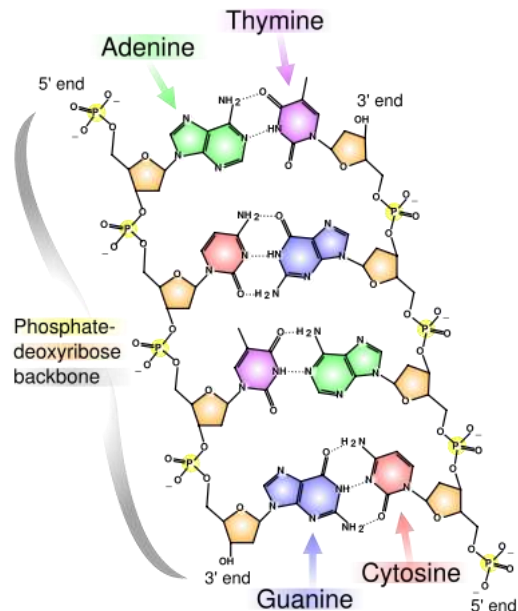
The Discovery of the DNA Structure

Crick's main interest in biology was how molecules make the evolution from non-living to living. It was clear to him that covalent bonds in biological molecules could give the stability needed to hold the genetic information inside cells. His challenge was to figure out exactly which of the many molecules was in fact that of the genetic molecule. The one fact that he knew about the genetic molecule was that it was a type of macromolecule and they knew that proteins are the structural and functional macromolecules that can often carry out reactions in the cell that require enzymes.

In the 1940s Crick had gained evidence that matched another type of macromolecule. This was the molecule of DNA, the second major component of chromosomes. X-ray crystallography was used to reveal the molecular structure of large molecules, like DNA. Some serious technical problems then arose with the x-ray crystallography that meant it could no longer be used to view molecules as large as DNA. Crick then went on to discover that X-ray diffraction could be used and went on to discover the most stable helical arrangement of amino acid chains in proteins, this was named the alpha helix. In the alpha helix the polypeptide folds by twisting into a right handed screw and all the amino acids form hydrogen bonds with each other. These hydrogen bonds allow the structure to form a very strong rod-like shape. From the alpha helix structure Crick learned that the peptide bonds within the structure relate to the bonds in the nucleotides in the DNA.



In 1951 Crick worked alongside James D Watson. Together they looked at Rosalind Franklin's results from x-ray diffraction and studied them to try and aid their understanding of the DNA structure. Eventually in 1953 Crick and Watson published a model for a helical structure of DNA. It was for this model that in 1962 Crick and Watson were jointly awarded the Nobel Prize.



Francis Crick Timeline

1916

Francis Harry Compton Crick is born 8 June in Northampton, England.

1930

Crick wins a scholarship to Mill Hill School, London.

1934

Crick studies physics at University College, London, graduating in 1937. He stays on to do graduate research.

1940

Crick joins the British Admiralty Research Laboratory, helping to design magnetic and acoustic mines.

1947-48

Crick joins the Strangeways Laboratory

1949

Moves to the Medical Research Unit at Cavendish Laboratory, where he worked alongside Max Perutz.

1950

Crick begins his second stint as a PhD student.

1951

James Watson arrives at the Cavendish and meets Crick. Crick and Watson begin work on their first DNA model.

1953

Watson and Crick publish their seminal paper on the Molecular structure of nucleic acids. They follow this in May with another paper that proposes a mechanism for DNA replication.

1955-58

Crick proposes that the DNA sequence is a code for protein sequence, predicts the existence of adaptors, and proposes that the information flows from DNA to protein, but not back again.

1961

Crick discovers that the genetic code is a triplet code.

1962

Crick and Watson awarded Nobel Prize

1988

Crick publishes his intellectual autobiography 'What Mad Pursuit: A Personal View of Scientific Discovery' (New York: Basic Books).

1994

Crick publishes his views on consciousness: 'The Astonishing Hypothesis: The Scientific Search for the Soul' (New York: Charles Scriber's Sons).

2001

Crick's papers are purchased by the Wellcome Library.

2004

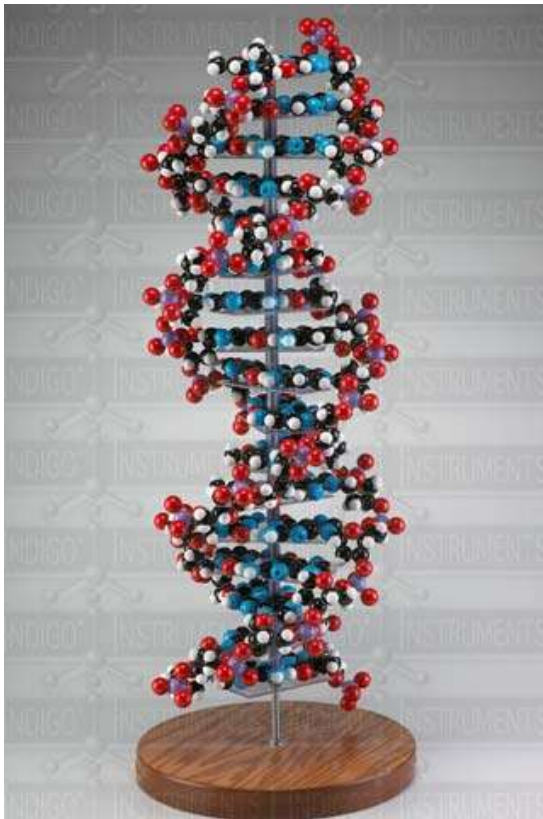
Francis Crick dies of colon cancer aged 88.

Impact on Society

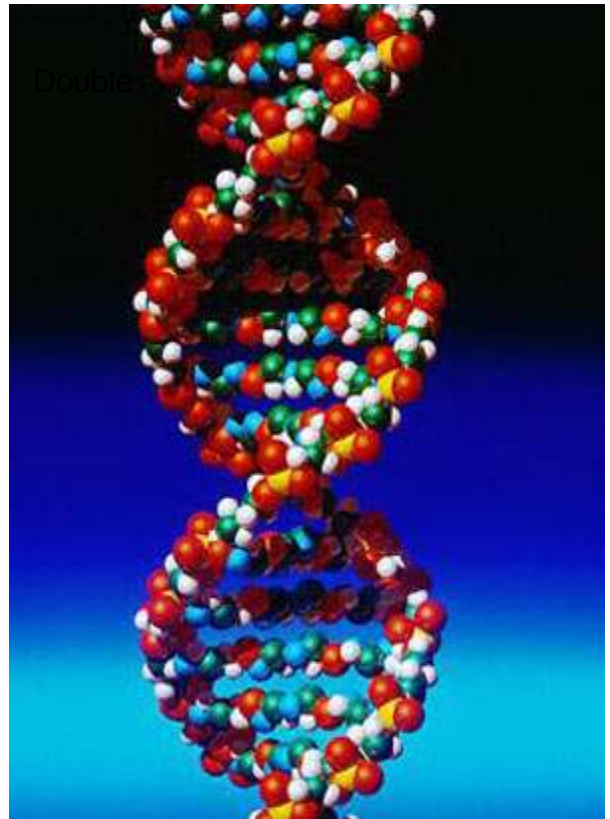
Crick was unaware of how much his findings would impact on society. But because of his studies:

- Modern day doctors can now provide replacement hormones that some genes in the body are unable to produce because of gene deformation.
- Further biological processes can be studied in relation to our DNA and so we can now study the exact ways in which our bodies work
- Gene deformations can be studied and the problem itself can be solved

The teachings of the human body in lectures and classes are now easily broken down and all pupils can understand the way in which our body works and the processes that our DNA controls.



Crick and Watson's Model



Double Helical DNA

Summary

In conclusion, Cricks discovery of DNA structure has had an impact on not only everyday life but in modern medicine. The discovery now allows doctors to isolate genes in order to remove or treat the single gene. As a result of the discovery the human body and its processes can be discussed and studied in great depth and we can study the genes to determine why we are the way we are.

For all of his commitment for biology throughout his life I believe that Francis Harry Compton Crick is a fundamental hero in science.

Bibliography

To complete this project I used:

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Of Molecules and Men by Francis H.C. Crick

Image of Crick – Nobel Prize

Image of Crick and Watson – Google images

Image of Double Helix – Google

Image of Base Sequence – Wikipedia

Image of Crick and Watson's Model - Google