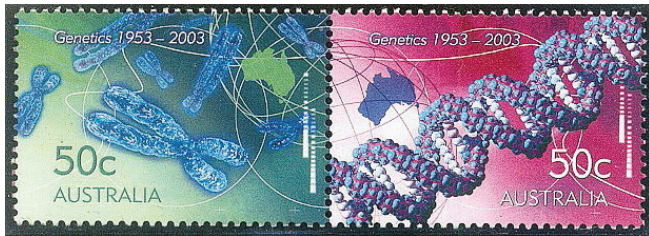


## MEDICAL PHILATELY

## DNA Discovery-Teamwork

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50<sup>th</sup> anniversary of DNA discovery,  
stamp-Australia-2003

DNA is probably the most famous molecule in the world. Its double helix shape is the single most familiar image from biology and chemistry. Apart from unraveling the mechanism of inheritance it has made possible new medical treatments, screening for genetic diseases, DNA fingerprinting, controversial technique of genetic engineering, and cloning. Science of **molecular biology** - a fusion of biology, chemistry and physics started with DNA.

By 1944, biochemists were coming to realize that nucleic acids rather than proteins were instruments responsible for characteristics inherited and it was deoxyribonucleic acid (DNA) of the chromosomes, that were key chemicals of life to carry the information. Whereby physical characteristics were inherited and it was deoxyribonucleic acid of the chromosomes that were key chemicals of life to carry information.

One method of studying internal structure of large molecules like proteins is X-ray diffraction. **Maurice Wilkins (1916-2004)** who obtained his Ph.D. in physics from Cambridge studied DNA in this manner and by 1953, his data yielded specific information on the type of regularities regarding nucleotides that were to be found. Problem was how best to interpret those regularities in atomic terms. Within the molecule of nucleic acid there was a definite relationship among nitrogenous bases. There were four such bases in the DNA molecule-

adenine, guanine (purines), thymine and cytosine (pyrimidines). Number of adenine units was always roughly equal to number of thymine units, while that of guanine was equal to cytosine.

**Francis Crick (1916-2004)**, educated at University College in London had obtained his PhD in physics. He turned to biochemistry or rather molecular biology and moved to Cavendish laboratory to study proteins. Young American **James Dewey Watson (b. 1928)** while studying for his PhD at Indiana University (USA), became interested in genetics, and involved himself in X-ray diffraction crystallography. Best work in the field at the time was done in England, so he set off to learn more, ending up in Cavendish lab at Cambridge, where he met Crick. Two became firm friends and shared an office together. They considered analyzing Wilkins X-ray diffraction data on DNA, but the work was hampered by poor quality films. Watson made models of possible structures that would accommodate what was known of DNA molecule at that time.

Second British group worked on the problem at Kings College laboratory, London. The team consisted of **Maurice Wilkins (b.1916- 2004)** and **Rosalind Franklin (1920-1958)** who after her degree in Cambridge went to Paris to learn more about X-ray crystallography; on her return she joined Wilkins to work at Kings College laboratory but, unlike Watson-Crick their relations



Crick and Watson Stamp-Palau 2000

soured. Rosalind's X-ray photographs taken at Kings College were brilliant. Unfortunately her role in the studies was constantly underplayed partly due to ant-feminist attitude at the time.

Crick and Watson made use of the key photograph taken by Rosalind Franklin, apparently without her permission and came with the revolutionary model of the nucleic acid molecule. The model represented it not merely as helix but as a double helix. Two sugar phosphate backbones winding like a double railed spiral staircase up the same vertical axis. From each sugar phosphate are held at the same distance apart by pairs of nucleotide bases interlocking in the centre acting like steps of a ladder. The bases are always paired in the same way adenine with thymine and guanine with cytosine. Structure of DNA so revealed, did indeed show how it works. Each strand works as a template- where adenine appears, a thymine must be added opposite it and so on. As cells divide to multiply, DNA is copied exactly into each new cell. The work was accepted immediately. Crick and Watson received the 1962 Medicine or physiology Nobel Prize with Rosalind Franklin for her work. Since she died before Nobel Prizes were given, portion of the prize was awarded to Maurice Wilkins along with Crick and Watson.