Women in Science
Rosalind Franklin

PRESENTER
British Chemist Rosalind Franklin was born in 1920. Monica Grady is Professor of Planetary and Space Sciences.

Monica Grady
It seems particularly appropriate to talk about Rosalind in this year, which is the International Year of Chemistry. Her field was x-ray crystallography so she used x-rays to study the structure of compounds and the particular thing that she was interested in was the structure of DNA. She was an extremely talented chemist and she was from quite a well to do family. She wasn't expected really to go into any sort of profession. She went to Cambridge to do a degree in chemistry and during the Second World War she worked for the British Coal Federation I think it was called, trying to understand the structure of coal so that you could get more energy out of it and after the War she was taken on at King's College in London. In those days King's College was a very, very traditional place where the professors, the lecturers used to go to the senior common room and women weren't allowed and so she was not allowed to take part in one of the most important bits of an academic's life which was the conversation when people are relaxing together.

The project she was working on was to look at the structure of DNA. It had been recognised that DNA, deoxyribonucleic acid, was very important somehow in the origin of life, cell division and growth. Nobody knew how it actually worked and there were several different groups of people all working towards this. Now Rosalind was an experimentalist and she was an extraordinarily good chemist and she worked tirelessly at trying to produce very pure separates of DNA which she could then x-ray to take a picture of the structure of DNA and her argument was that I can then interpret those x-rays in what we know about crystal structure. Crystals are made up of atoms and atoms can be arranged in different ways which gives crystals their different shapes and you can tell a lot about how the atoms are arranged in a crystal by shining x-rays on them because the x-rays actually interact with the atoms and you get a different pattern of the way these x-rays interact which can be recorded on a photographic plate. This was a speciality of Rosalind Franklin. Now her x-ray photographs were absolutely impeccable. They could almost be described as beautiful. They're like crosses with a ring round the outside and trails through the crosses where you can see the atoms would be and were interacting with the x-rays and at first it was thought that DNA might have just been a single spiral, a single helix, but it didn't take Rosalind long to realise that her photographs were showing that actually it was two strands that were intertwined.

There was another set of people working on this problem, led by Francis Crick and James Watson at Cambridge. They were trying to build a model of DNA just from theory and Maurice Wilkins who was the head of Rosalind's department, he worked quite closely with Crick and Watson and some of her results were reported to Crick and Watson in a slightly underhand way. Wilkins showed Crick her x-ray photographs and it was immediately apparent to Crick what the x-ray photograph implied. Rosalind wasn't aware that this conversation had happened and this is illustrative of something which fortunately doesn't really take place any more where women have been excluded from scientific discussion when the results that they have acquired through their own hard work and excellence are sort of not quite taken away from them but are reported and then used. She was on the right lines. She'd come to the conclusion that there were two strands that were intertwined. What she hadn't figured out, which is what Crick and Watson figured out, is that while one strand ran from north to south, the other strand ran from south to north and it was this going the other way while they were entangled which gives DNA its structure.

She died tragically young of ovarian cancer but she was active in chemistry and crystallography just until a few weeks until her death and she did a huge amount of work, not just on the structure of DNA, but on the tobacco mosaic virus, which is an understanding of how viruses differ from bacteria. The work she did in that she did get scientific recognition in her later years.

Crick, Watson and Wilkins were rewarded with the Nobel Prize for chemistry four years' after Rosalind's death. Rosalind died at the peak of her scientific career and who knows what else she would have achieved and it's very ironic that her contribution to uncovering the structure of DNA is so important now when we try to understand how to cure diseases like cancer. DNA still is a very, very important field. I mean we have things now like the Human Genome Project and none of that type of work could have taken place without an understanding of the structure of DNA.

Rosalind was persistent and determined and she was a perfectionist and I really, really admire her for that.