DNA and the Maiden

Extraordinarily talented, tenacious, and persistent. One of just a few girls in 1930s London who chose physics and chemistry in secondary school. Already at 15 years old she knew she would be a scientist. In 1938, against the wishes of her father (opposed to women's education, hoping his daughter would become a social worker as befit a young lady), she gained entry to Newnham College in Cambridge, which she graduated from in 1941. The doctorate thesis she defended at Cambridge in 1945 was based on work she did for the British Coal Utilisation Research Association. In 1951, after three years of fruitful research at the Laboratoire Central des Services Chimiques in Paris, where she taught radiographic techniques, she became an assistant at John Randall's lab at King's College London. There she worked under Maurice Wilkins, who would end up elbowing her out of sharing recognition for a truly game-changing discovery. Her pioneering work was of key importance for unraveling the structure of DNA, yet her name was hardly mentioned in the publication announcing James Watson and Francis Crick's double-helix model.

The woman we are talking about is Rosalind Franklin. The many contradictory stories that have arisen about this controversial female researcher fascinate historians of science, but otherwise few people have heard of her. James Watson's "The Double Helix" states that she was "difficult" and also known for her feminist views, which she even went so far as to express vocally. Watson does not deny the power of her intellect, but maintains that she was skeptical of the helical structure of DNA and aggressive, even virulent, in her criticism. But perhaps that aggression stemmed from the fact that her boss, behind her back, had given the results of her work to two talented coworkers who had no intention of collaborating with her? The picture that emerges from Anne Sayre's study of her life is completely different from the one Watson remembered.

Before Rosalind Franklin began her work, deoxyribonucleic acid, or DNA, was thought to be a specific binding agent linking protein molecules. When the four nitrogenous bases that make up DNA were discovered, attention turned to how those elements combined together. At King's College London it was Maurice Wilkins who had been doing X-ray research on the structure of DNA for some time, but Wilkins was in fact away for a long period when Franklin was perfecting her method of X-ray crystallography used to identify the helical structure. Randall gave Franklin a free hand in the project to resolve DNA's structure. But when Wilkins came back, he treated her like a lab assistant. That did not have to be anything personal: in those days scientists simply frequented male-only discussion clubs at universities, whereas women did their research off on their own and quietly. Wilkins then showed Franklin's X-ray diffraction images of deoxyribonucleic acid (including the famous photograph 51 from 1952, which is still considered one of the best and most valuable research images) to James Watson and Francis Crick without Franklin's knowledge or consent. When they formulated their breakthrough model, they largely based themselves on a report Franklin wrote for the Medical Research Council in 1952, containing the first assertion of phosphate molecules situated outside the DNA ladder. Watson and Crick first rejected that theory for a long time, trying to create a model with the nitrogenous bases on the outside of the structure. For Franklin the chemist, it was obvious from the outset that the hydrophobic bases had to be inside a phosphate shell, an opinion Watson and Crick did ultimately become convinced of.

The famous photograph 51 from 1952 is still considered one of the best research images ever

The article describing the structure of the DNA molecule was published in Nature *in 1953. Another article by Franklin was published in the same issue, describing her X-ray diffraction images, but it was treated as supporting the main paper. In her article, Rosalind mentioned Watson and Crick's important role in the breakthrough, whereas the men only mentioned that they had used her images. After this incident Franklin moved to another laboratory at Birkbeck College, where she obtained interesting results studying the tobacco mosaic virus and began working on the polio virus.*

When Watson, Crick, and Wilkins won the Nobel Prize in physiology and medicine in 1962 for their work on DNA, Franklin was no longer alive, most likely killed by the scientific work she loved so much – by excessive X-ray exposure. She was 37 years old when she succumbed to ovarian cancer. Academia *commemorates her on the 50th anniversary of the decipherment of the genetic code.*

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