Rosalind Franklin

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Rosalind Franklin and DNA.

by Anne Sayre

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Most biologists will probably agree that the greatest and most important scientific discovery of the 20th Century was the revelation of the structure of DNA in 1953. All biology students and even high school students interested in biology associate this fundamental discovery with the names of James Watson and Francis Crick. A few scientists and students still know that the Nobel Prize awarded in 1962 was actually shared by Francis Crick and James Watson with Maurice Wilkins, then at the King's College in London. And a still smaller number know that Rosalind Franklin, another English scientist, was not given this great honour although her work was an important contribution to Watson, Crick and Wilkins' discovery. She died very young in 1958 at the age of 38 and the Nobel Prize is not given posthumously. Anne Sayre, an American writer and friend of Rosalind Franklin, wanted to set this story straight and so

tells us in her book that we should closely associate Franklin's name with the discovery of the DNA structure. The book, brought out last year in a new edition by Norton & Co., also illuminates the shocking gender inequality in English education and science throughout the 1940s and 1950s. First published in 1975, Sayre's book became widely cited in feminist circles for exposing rampant sexism in science. That has changed, but the story of Rosalind Franklin and her contribution to the discovery of the structure of DNA still deserves to be told.

Many of us have read the story about the discovery of the structure of DNA in James Watson's book 'The Double Helix'. I myself read this book as a graduate student in the late 1970s and my recollection of the story is that Watson ingeniously put all the disjointed pieces of the great puzzle together and built the model of DNA. He was my hero: a motivated, intelligent, young man who used all freely available information, such as Chargaff's equivalence rule, chemical formulae of the bases and X-ray diffraction data, to obtain a solution to the most prized question in biology.

From Sayre's story, however, I learned that the crucial high-quality X-ray diffraction patterns of DNA were in fact privileged unpublished information taken without permission from a scientist working on the same subject in another laboratory. This scientist was Rosalind Franklin. She patiently mastered the technique of preparing DNA samples and was steadily improving the quality of their X-ray pictures in order to have clear-cut data allowing her to propose the structure of the DNA. She was an exemplary scientist who wanted to double-check her results before jumping to conclusions. And indeed, she was close to a solution. As early as November 1951, she gave a seminar where Watson was present and she concluded that DNA forms a 'big helix in several chains, phosphates on the outside'. Shortly thereafter, Crick and

Watson built in their laboratory at Cambridge a triple-stranded DNA model with a sugar-phosphate backbone inside. They were entirely satisfied with the result and consequently invited the King's College group with Wilkins and Franklin to its presentation. But Franklin immediately pointed out that this particular model did not agree with X-ray data and therefore must be wrong. The obvious solution to get a correct model was to obtain better X-ray data and Franklin continued to systematically work toward this end.

Franklin did not know, however, that her new data were made available to the competing group at Cambridge, partly through internal documents that were not intended for distribution and partly through disclosures by Wilkins during his discussions with Watson. Thus, while she was devoting her time to collect new data, Watson had them presented to him on a silver platter and had time to compare them with different DNA models and discuss those with his co-worker Crick. Most of us would be furious if our unpublished results were not only leaked to our competitor but gave him or her a crucial lead to solving the vital problem we were working on.

We all know the end of the story, but many of us do not realise that much of the credit for the discovery of the structure of DNA should have been given to Rosalind Franklin. Indeed, Watson and Crick did not give her this well-deserved credit in their memorable *Nature* paper. In addition, Watson later greatly diminished Rosalind Franklin's contribution or even negated it in 'The Double Helix'. Anne Sayre presents a counterpart to the better-known description of Watson's glorious work. I lost my hero from my time as a student but I replaced it with another one who is more humane and more tragic.

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