The first lady of DNA

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Rosalind Franklin: The dark lady of DNA
by Brenda Maddox
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The story of Rosalind Franklin never ceases to fascinate, and the publication of her biography as told by Brenda Maddox is indeed pertinent: in a few weeks' time we will celebrate 50 years of the most illuminating discovery in life sciences, namely the revelation of the structure of DNA. In the 25 April 1953 issue of *Nature*, three consecutive short papers ushered in a new era in biology by unveiling an ingenious model of the DNA structure, together with the X-ray diffraction data crucial for its formulation. The best known of the three papers is the one by James Watson and Francis Crick, who both then worked at the Cavendish Laboratory of Cambridge University. Watson and Crick proposed that DNA forms a right-handed helix composed of two anti-parallel DNA strands, which are kept together by specific hydrogen bonds between adenines and thymines and between guanines and cytosines. The notion of complementarity was born, and it immediately suggested a conceptually simple mechanism for copying genetic information over generations of cells and organisms.

The other two papers presented X-ray data obtained by two research groups at King's College, London, one led by Maurice Wilkins and the other by Rosalind Franklin. It was Wilkins who initiated the X-ray diffraction

studies of DNA fibres and who obtained the first promising diffractograms suggesting that DNA could be helical. However, it required the experience and experimental skills of Franklin to obtain high-quality X-ray diffractograms that contained the definitive information that Watson and Crick needed to propose their famous DNA model.

Good fortune accompanied Watson, Crick and Wilkins, as in 1962 they shared the Nobel Prize for the discovery of the DNA structure, and will soon be rejoicing the golden jubilee of their memorable finding. Unfortunately, this is not the case for Franklin, who died of cancer at the age of 37 in 1957, well before the Nobel committee could have considered the significance of her contribution. This tragic fate cut short the life of a very talented researcher, and no one could have prevented it. However, in her case, there is a profound feeling of overwhelming injustice, because she was also deprived of the exceptional fame as one of the co-discoverers of the DNA structure, the fame that lasts much longer than life itself.

Historians of science, and the scientists directly involved, have frequently reanalyzed the complex interactions between Franklin, Wilkins, Watson and Crick at the time of the determination of the DNA structure in the early 1950s. In each case, the reanalysis has centred to varying degrees on two principal questions: would Watson and Crick have been able to formulate their ingenious model without seeing Franklin's then unpublished data? Was Watson and Crick's unauthorized use of their competitor's data within the accepted rules of scientific practice? All who are concerned with these questions will find this new book very interesting. Brenda Maddox, an award-winning biographer, researched the story with tremendous accuracy. She interviewed all major participants in the DNA race, and collected information from friends and family members of Rosalind Franklin. The resulting

book is first of all a moving biography of a girl, and then a young woman, who devoted her life to science. The science is very well presented and the two principal questions mentioned above are considered at length. It was not known to me, for example, that in 1954 Watson and Crick clearly stated, in a footnote to another paper, that without the crystallographic data obtained at King's College the formulation of their DNA model "would have been most unlikely, if not impossible". This statement strongly contradicts the finishing statement in their most famous 1953 *Nature* paper, in which Watson and Crick, referring to the X-ray data in the two directly following papers from Wilkins's and Franklin's groups, wrote, "We were not aware of the details of the results presented there when we devised our structure...". Whatever the motivation for this misleading statement — presumably to protect the person who provided Franklin's data to Watson and Crick — it has stolen a significant chunk of the scientific fame rightly owing to Rosalind Franklin.

In April 2003 *Nature* will certainly devote a lot of space to the Watson and Crick 1953 paper, and will perhaps even reprint it. This would be a very appropriate occasion for Watson and Crick to write a long-overdue corrigendum, stating that the high-quality X-ray data obtained by Rosalind Franklin and Raymond Gosling (a Ph.D. student working under the supervision of Franklin) were in fact essential for the formulation of the DNA model. Such a corrigendum would reassign part of the merited fame to Rosalind Franklin. For her it no longer matters, but we would all feel better. While teaching our students scientific ethics, we could replace the bad example with a good one.

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