



ROSALIND FRANKLIN-THE DARK LADY OF DNA DISCOVERY (A REVIEW)

Biological Science

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ABSTRACT

Rosalind Franklin made a crucial contribution to the discovery of the double helix structure of DNA, but some would say she got a raw deal. Biographer Brenda Maddox called her the "Dark Lady of DNA," based on a once disparaging reference to Franklin by one of her coworkers. Unfortunately, this negative appellation undermined the positive impact of her discovery. Indeed, Franklin is in the shadows of science history, for while her work on DNA was crucial to the discovery of its structure, her contribution to that landmark discovery is little known.

KEYWORDS

Introduction

Rosalind Franklin, in full Rosalind Elsie Franklin, (born July 25, 1920, London, England—died April 16, 1958, London), she born in wealthy Jewish family and she is best known for her contributions to the discovery of the molecular structure of deoxyribonucleic acid (DNA), a constituent of Chromosomes that serves to encode genetic information. Franklin also contributed new insight on the structure of viruses, helping to lay the foundation for the field of structural virology. . Franklin worked hard and played hard. She was an intrepid traveler and avid hiker with a great love of the outdoors who enjoyed spirited discussions of science and politics. Friends and close colleagues considered Franklin a brilliant scientist and a kindhearted woman. However, she could also be short-tempered and stubborn, and some fellow scientists found working with her to be a challenge. Among them was Maurice Wilkins, the man she was to work with at King's College.

Early life and Education

Franklin was educated at Norland Place, a private day school in West London Lindores School for Young Ladies, a boarding school in Sussex and Saint Paul's Girls school in London. She then graduated in 1941 in Natural Sciences at Newnham College, Cambridge. She earned a research fellowship and joined the university of Cambridge physical chemistry laboratory under Ronald George Wreyford Norrish, who disappointed her for his lack of enthusiasm. The British Coal Utilisation Research Association (BCURA) offered her a research position in 1942 and started her work on coals. She received her Ph.D. on this work. That work led to her research on the structural changes caused by the formation of graphite in heated carbons—work that proved valuable for the coking industry. She went to Paris in 1947 as a chercheur (postdoctoral researcher) under Jacques Mering at the Laboratoire Central des Services Chimiques de l'Etat, where she became an accomplished X-ray crystallographer. She became a research associate at King's College London in 1951 and worked on X-ray diffraction studies, which would eventually facilitate the discovery of the double helix structure of DNA. In 1953, after two years, owing to disagreement with her director, John Randall and her colleague Maurice Wilkins, she was compelled to move to Birkbeck College. At Birkbeck, John Desmond Bernal, chair of the physics department, offered her a separate research team. She died in 1958 at age 37 of Ovarian Cancer.

Franklin was born on July 25, 1920, in London, to a wealthy Jewish family who valued education and public service. At age 18, she enrolled in Newnham Women's College at Cambridge University, where she studied physics and chemistry. After Cambridge she went to work for the British Coal Utilization Research Association where her work on the porosity of coal became her Ph.D. thesis, and later it would allow her to travel the world as a guest speaker. In 1946, Franklin moved to Paris where she perfected her skills in X-ray crystallography, which would become her life's work. Although she loved the freedom and lifestyle of Paris, she returned after four years to London to accept a job at King's College.

DNA Discovery

Role in DNA discovery A misunderstanding resulted in immediate friction between Wilkins and Franklin, and their clashing personalities served to deepen the divide. The two were to work together on finding

the structure of DNA, but their conflicts led to them working in relative isolation. While this suited Franklin, Wilkins went looking for company at "the Cavendish" laboratory in Cambridge where his friend Francis Crick was working with James Watson on building a model of the DNA molecule.

In 1951 Franklin joined the Biophysical Laboratory at King's College, London, as a research fellow. There she applied X-ray diffraction methods to the study of DNA. When she began her research at King's College, very little was known about the chemical makeup or structure of DNA. However, she soon discovered the density of DNA and, more importantly, established that the molecule existed in a helical conformation. From 1953 to 1958 Franklin worked in the Crystallography Laboratory at Birkbeck College, London. While there she completed her work on coals and on DNA and began a project on the molecular structure of the tobacco mosaic virus. She collaborated on studies showing that the ribonucleic acid (RNA) in that virus was embedded in its protein rather than in its central cavity and that this RNA was a single-strand helix, rather than the double helix found in the DNA of bacterial viruses and higher organisms.

Franklin presented their data at a lecture in November 1951, in King's College London. In her lecture notes, Franklin wrote the following.

"The results suggest a helical structure (which must be very closely packed) containing 2, 3 or 4 co-axial nucleic acid chains per helical unit, and having the phosphate groups near the outside."

Unknown to Franklin, Watson and Crick saw some of her unpublished data, including the beautiful "photo 51," shown to Watson by Wilkins. This X-ray diffraction picture of a DNA molecule was Watson's inspiration (the pattern was clearly a helix). Using Franklin's photograph and their own data, Watson and Crick created their famous DNA model. Franklin's contribution was not acknowledged, but after her death Crick said that her contribution had been critical.

Franklin never nominated for Nobel prize for her contribution in DNA discovery, although Watson, Crick and Wilkins were awarded for Nobel Prize in 1962 in medicine category for unraveling DNA structure. She did not receive noble prize due to some reasons. 1. In early DNA discovery was not given so important. 2. Nobel prize not given posthumously. 3. Nobel prize also not shared more than three persons for single cause.

Although Watson, Wilkins and Francis Crick received Nobel prize for discovery of DNA structure but it was result of five people working "Pauling, Wilkins, Watson, Crick and Rosalind Franklin."

Conclusion

According to James D Watson (Nature, 1983) "Rosalind Franklin was a very intelligent woman, but she really had no reason for believing that DNA was particularly important. She was trained in physical chemistry. I don't think she'd ever spent any length of time with people who thought DNA was important. And she certainly did not talk to Maurice Wilkins or to John Randall. Rosalind Franklin was not credited for DNA discovery during her lifetime but her contribution was well regarded after death. She was very intelligent and hard working lady. We have lost her at a very early stage but her work will inspire many

researchers. She received several award and recognition posthumously.

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