Atlantis Book Reviews

Rosalind Franklin and DNA Anne Sayre. New York: Norton, 1975. Pp. 221.

ROSALIND FRANKLIN

Rosalind Franklin was a brilliant young British scientist who died in 1958 at the age of 37. Death deprived her of the Nobel prize for her work in connection with the structure of DNA, the discovery which unlocked the centuries old mystery of the hereditary process. But sexism in the scientific community robbed her of the knowledge that her work in crystallography was crucial to the three men--James Watson, Francis Crick and Maurice Wilkins--who shared the prize four years later.

Literally her work was stolen, passed on to Watson by Maurice Wilkins without her consent; nor did she ever learn later or suspect that anything improper had taken place. That this could happen in the world of science, la carriere ouverte aux talents, the discipline which more than any other can claim universality and independence from prevailing prejudices, writing its own history in the language of scepticism and dissent from dogma is especially ironic, and will be denied by all who continue to believe that, apart from a few bad apples, the scientific community is a world of dedicated scholars, labouring anonymously in the service of truth. That there has been no protest launched against a serious breach of professional ethics is indicative of the status of women in science.

Anne Sayre's biography of Rosalind Franklin attempts to undo the injustice, revealing en passant the sexist politics in science. Yet she also shares

in its mystique. Future historians of science may restore Rosalind Franklin to her proper place, correcting the prejudicial version given by James Watson in The Double Helix,(1) but as long as the mask and sacred aura of science remain intact, male dominance remains assured, and an environment maintained where male colleagues can appropriate the findings of women, take credit for their work and keep them in their place, receiving scarcely more than a slap on the wrist. Rosalind Franklin, a tough-minded scientist with no illusions about humankind, never doubted the professional integrity of the men who cheated her.

It is our worship of and deep reverence for the sanctity of science that accounts for so few women mentioned in the history of science, for their underrepresentation in science faculties, science foundations and granting agencies, for their negative stereotype. Women in science are like women in preliterate societies: they are regarded as unclean, permitted to approach but not look directly upon totemic sites, forbidden to handle totemic objects or participate in sacred ritual. Science, the secular counterpart of religion, observes the same taboos, but in the modern version the stigma is part social --women are unable to give the total commitment required--and part mental: nature has denied women the aptitudes--a "thing" rather than a "person" orientation--and intellectual skills--high levels of abstraction and reasoning--that make for scientific competence. Paradoxically, women have been excluded from science in the past on the grounds that they rely too heavily on intuition and not enough on cognitive skills. But, nowadays, as science is being rewritten to emphasize creativity more than logic, women are described as deficient in intuition. Watson, in The Double Helix and C.P. Snow (reviewing Anne Sayre's book in The New York Review of Books)(2) both claim that Rosalind Franklin fell short of greatness because her mind would not leap ahead of facts. Whatever skills or combinations of them psychologists decide are required for science, women possess them to a lesser degree than men. Hence, women are destined to teach science rather than create it, to instruct elementary and high school students rather than university students, carry out routine laboratory procedures rather than innovate, assist men in working on problems which they or other men define, clustering in the biological sciences rather than the more prestigious ones of Physics and Chemistry. So, despite her true grit in achieving advanced degrees in science, despite the sneers and snickers she has endured as being "unfeminine" or worse, the woman scientist winds up replicating the conventional roles of women as socializers of the young, helpers of men and cleaners-up of other people's messes.

The tragedy is that women who do go into science knowing the stereotype of them to be false so often remain silent,

acquiescing in it by curbing their aspirations, denying their endowment, ascribing their inequality as a division of labour, making themselves over into either the nurturant mother-nurse figure or the boyish woman who has grown older but never outgrown the latency phase of her psycho-sexual development. Either way they sustain the fact of male superiority and its legitimation. The damage they do themselves both economically and psychologically has yet to be fully reckoned, but there is no doubt that the silence and conformity of women in science made Rosalind Franklin's case unusual but not exceptional.

All of this might never have come to light if James Watson had not written The Double Helix, a candid inside account of how he and Francis Crick arrived at their discovery. The Double Helix was a breezy, informal story spiced with little bits of gossip about a lot of big names, disclosing how things work in the backrooms of famous laboratories, written at a level the layperson could understand and amusing for the professional. It had just the right touch of irreverence, showing the distance between the ideal model of scientific activity, the model we all learn in school of orderly, logical, step-by-step progress and the reality with its elements of chance, the vagaries of funding, the gambles that didn't pay off and those that did. Scientific creativity is a wayward process, as digressive and irrational on a day to day basis as any other form of creativity. The Double Helix also confirmed our suspicions that in science, just as in any other field, success depends upon being in the right place at the right time, plugged into the right networks and knowing the right people. Finally, it made clear that the scientist's drive may be as profane as the hustler's in the market place. All of this and an adventure story, too.

Two young scientists came together more by accident than design at the Cavendish laboratories (Cambridge) in the early 1950s. Watson, the gangling American still under 25, educated in the Middle West, part Huckleberry Finn and part Jimmy Stewart, puzzled by British mores, frequently gauche, he was that endearing figure of American populist legend, the Yank at Oxford. Crick, British, still working on his Ph.D. was the erratic genius, the Luftmensch, totally absorbed in abstruse theories with a strange habit of speaking too loudly which made him an unwelcome guest at high table. Both outsiders, both tolerated in the democratic Republic of science.

They were ideal collaborators but the odds were stacked against them. First, in the rationalized organization of British science, work on DNA was assigned to another lab, King's College (London) under the direction of Maurice Wilkins. Accordingly, they were admonished by the Director of Cavendish not to work on DNA, a directive they

chose to ignore. And second, Linus Pauling, the distinguished scientist at Cal. Tech and several times winner of the Nobel prize, was close to discovering the structure of DNA. Part of the fun and much of the suspense of The Double Helix is the race with Pauling, as the two young unknowns take various wrong turns, overlook clues, feed on leaks of information about Pauling's work, are put back on the right track by friends who drop in or visitors to the lab. Will the two young Davids slay Goliath?

The truth is, according to Anne Sayre and Pauling's son, the race against Pauling was more fiction than fact. Pauling was interested in DNA but not exclusively, and was not coming down the home stretch in a dead heat. The real race, according to Sayre, was with King's College; that is, with Maurice Wilkins and Rosalind Franklin who had the administrative green light to work on DNA and were making progress in that direction although the relationship between them, Wilkins and Franklin, was decidedly antagonistic. Either way, Watson wins, for if he and Crick only imagined they were in a contest with the California giant, they struck a blow against the planning of British science in favour of good old American individualism and the free market.

Rosalind Franklin comes into Watson's scenario as a crystallographer with the traditional respect of experimental scientists for hard evidence, working on DNA under the supervision of Maurice Wilkins; in other words, a fine technician, an earth-bound data gatherer and an assistant to someone else. In this account, she could hardly have been a major figure, but could have been a major obstruction. Watson's descriptions of her personality are less than flattering, but he is so frank about his own warts and about those of others with far bigger reputations that it slips by. "Rosy," as he calls her--tutoyer form which offends Sayre and which she regards as part of the put-down which it may have been since he never refers to anyone else in this diminutive form but which I am inclined to attribute to the folksy informality of American groves of academe--emerges as hysterical, capable of frightening outbursts of temper, coldly logical, difficult to get along with, secretive and lacking the larger scientific imagination; a rather thinly disguised witch. Taken together, her personality, her subordinate status and her limited imagination, there was little to make two young ambitious men defer to her rights. Why should scientific progress be held up by an unstable woman who would not cooperate with her superior (Wilkins)? Why should Pauling win the race when the data which would give it to them was locked up in her office? Why should they be denied the glory when she who had the answer right under her nose failed to understand its sig-

nificance? By turning her evidence over to Watson without her consent or knowledge, Wilkins might be straining professional ethics, but not seriously transgressing them. "My own view," C.P. Snow writes, "is that Wilkins behaved in the highest spirit of scientific candor . . . and that Watson and Crick were justified in doing what they did, simply because they saw what no one else saw and what they had been looking for with deeper insight than anyone else in the game."

These were not the rules of the game that Rosalind Franklin played by, and it still leaves unexplained why she was never told. The Rosalind Franklin who emerges from Anne Sayre's book was a colleague of Wilkins and working independently; she was neither his assistant nor his subordinate. As a scientist she was as much a theorist as a technician. Moreover, she had already discovered the helical structure of DNA and had discussed it publicly in a colloquium as early as 1951, a meeting which Watson had attended, and, she had discussed it again in a research note to the administrative director of the lab. While fully grasping its significance, she was not satisfied that the evidence was so definitive. Nothing, then, justified the theft or what happened subsequently. At the very least, according to Sayre, she should have been given joint authorship of the paper which Watson and Crick published after viewing her pictures which solved the last problem they had been wrestling with.

Wilkins has since acknowledged that he was perhaps wrong in his action, but his misdeed was, in fact, part of a larger matrix of social and academic discrimination. Rosalind Franklin was rich and well educated, blessed with a family that appreciated her scholastic achievements, yet she had to overcome her father's opposition to her career in science. Whether it is a bigot who wants his daughter to marry and bear children or the enlightened middle class father who, like Franklin's, wants his daughter to devote herself to social service, it hardly matters. The strain, the conflict, and soul hardening are the same.

But Rosalind Franklin was one of the lucky ones. After taking her degree in Physical Chemistry despite parental opposition she had no difficulty getting a job. World War II with its domestic manpower shortages and its new mushrooming agencies provided countless women university graduates, myself included, with opportunities to move into professional positions which a few years earlier or a few years later were closed. It is a good example of how opportunities for women are tied to the marginal labour market and the exceptional periods in history.

When the war was over, she went to Paris where she was insulated against the anti-feminist prejudices of Britain and the English-speaking world. There she

thrived, working with a more cosmopolitan group of scientists, and learning the techniques of X-ray diffraction, her first venture into crystallography as it was being developed in metallurgy. In 1951 she returned to England where at King's College (London) she was to develop them further and use them with biology.

King's College in 1951 had a distinguished scientific team but provided no welcome mat to women. Men, for example, had their own dining room, "large, comfortable, rather clubby" while women, regardless of age or rank, were forced to take their meals in the students' dining hall or off the grounds. Apart from the symbolic insult this represented, it was part of a pattern in which women were isolated from the important informal communication systems where shoptalk is exchanged along with gossip and discussion of sports scores. Sayre makes the point that what often handicaps women in male groups is their subtle exclusion from the places where news is passed on and ideas, not yet fully formulated, are tossed out for friendly testing. Universities, banks, political parties, government agencies, unions and business are no different in this respect. The men at King's and their colleagues elsewhere knew more about Rosalind Franklin's work than she knew about theirs. Whether she would have moved along more quickly if she had had the same access to information, whether she would have had more confidence in her hunches, we will never know. But the deep insight that she lacked, according to C.P. Snow, is, I suggest, a function of information exchange and not some mysterious property of the brain.

By 1953, Watson and Crick, using their method of model construction, had reached an impasse where they could have remained indefinitely, hoping that one of their random guesses would prove correct. Rosalind Franklin, on the other hand, using an experimental method, had the solution but was wavering. It was at this decisive moment that Wilkins told Watson about her pictures, choosing to interpret her attitude as "opposed" to the helical structure rather than cautious. Shortly after, Watson and Crick published their paper and Rosalind Franklin published hers as confirming <u>their</u> results rather than the other way round.

The case Sayre makes is too strong to be disregarded. The real Rosalind Franklin had little in common with Watson's "Rosy," and one wonders whether the real Crick, Wilkins and others are similarly caricatured. How much confidence can serious scholars have in <u>The Double Helix</u> as a reliable picture of how scientists work? And who will correct it given the fashions in science historiography?

Writing in <u>The New York Review of Books</u>, C.P. Snow shares Anne Sayre's distrust of Watson, but he has his own axe to

grind. In his view, Francis Crick was short changed! And, as noted earlier, Snow defends his friend, Wilkins, against any charges of violating professional ethics. As for Rosalind Franklin, Snow admits that she would have discovered the structure eventually, but he cannot bring himself to say that Watson and Crick needed her more than she needed them. Snow further argues that although she was a good scientist she was not a great one, that she lacked vision because her scientific nose was held too closely to the grindstone. "In the major breakthroughs," he writes, "scientists have usually guessed much of the answer before they start. Crick and Watson had certainly guessed a good part of the answer about DNA. Rosalind Franklin hadn't and would have thought worse of herself if she had." Yet Watson's account is full of evidence that he and Crick were working in the dark, that they sat and stared at their model stumped. Snow's great scientist is, in addition to being omniscient, a compulsive worker. As evidence of his claim that Rosalind Franklin did not appreciate the significance of her findings, he cites the fact that "in the middle of 1952 she took a month off to make a tour of inspection in Yugoslavia. Anyone," he continues, "who has seen a scientist certain that he is on to a great thing--as with Chadwick working twenty hours a day to identify the neutron--will know how much that behaviour reveals." Had Snow gone back to The Double Helix he would have found that Watson and Crick were not as driven as Chadwick either, that they took time out for meetings, for ski holidays, and other leisurely pursuits. Either Snow has some romantic notion of the scientist or he is implying that all things being equal women lack the commitment of a great scientist even when they have no interfering domestic responsibilities.

Sexism dies hard, and it does not help when books by women about women are reviewed by men who may do their best to be fair-minded but are incapable of understanding their own double standard of morality.

NOTES

1. James D. Watson, The Double Helix (New York: Signet, 1968).

2. C.P. Snow, "The Corridors of DNA," The New York Review of Books, Nov. 13, 1975, pp. 3-4.

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