hood" must recognize the need for stiff standards of analysis and must reject the pervasive tendency to see criticism as personal attack. If we cannot be critical of each other's ideas, how will we make any progress towards an understanding of women's role, past and present, in Canadian society?

Eliane Silverman AND **Margaret J. Osler**

WOMEN IN SCIENCE: A DISCUSSION

James Watson's The Double Helix (1968) and Anne Sayre's Rosalind Franklin and DNA (1975) cast new light on the social roles of scientists at work. The Double Helix, describing the process of the discovery of the molecular structure of DNA, a discovery which won the Nobel Prize for James Watson, Francis Crick and Maurice Wilkins in 1962, challenges the popular conception of science as a rational and dispassionate search for the truth. Instead, we find the protagonists engaged in a competitive race, ruthless in their quest for a solution. One of the victims of their single-mindedness was Rosalind Franklin, a member of the King's College, London, research group and a colleague of Maurice Wilkins. The X-ray diffraction data she had gathered on the DNA molecule provided a key element in the ultimate unravelling of the problem. At a crucial juncture in Crick and Watson's model building, Wilkins, unbeknownst to Franklin, provided them with her data. Throughout Watson's account of this intriguing story, his personal contempt for Franklin is unabashed: he disdained her intelligence and creativity and found her deeply unattractive, criticizing everything from her appearance to her personality. A perfunctory epilogue, which Watson wrote after Franklin's early death in 1958, is coolly polite but does not change the overwhelming impression given throughout the book of an unimpressive, uninspired, yet aggressive and hostile colleague.

In response to Watson's book, Anne Sayre, a novelist and a friend of Franklin, attempted to redeem her friend's reputation. Sayre described Franklin's early inclination to science, her training at Cambridge in physical chemistry, her large number of important papers in that field and her well-developed sense of self-respect. Portraying a more attractive person than Watson had seen, she ascribed Watson's perceptions of Franklin to his profoundly hostile and demeaning attitudes towards women.

The juxtaposition of these two books raises significant questions about the role of women in science and, more generally, the sociology of scientific research. In a recent review in Atlantis, Thelma McCormack undertook to discuss some of these problems, particularly in the light cast by Franklin's career on discrimination against women

in the scientific professions.(1) We think that she failed to provide an adequate historical analysis of the images and realities of science. Certainly, the issues raised by research in the developing field of women's history are so close to our own real-life struggles that it is not surprising to find confusions of scholarship with rhetoric.

McCormack's review displays ambivalence towards the scientific endeavour. She accepts the image of science as "the discipline which more than any other can claim universality and independence from prevailing prejudices . . . a world of dedicated scholars, labouring anonymously in the service of truth."(2) Having then discovered blatant violations of this image in the behaviour of Watson, Crick and Wilkins, she expresses outrage. At the same time, she derides C.P. Snow's review in The New York Review of Books on the grounds that, in his assessment of Sayre's book, some abstract scientific ideal was employed to judge Franklin's abilities in a negative and male-oriented way. While McCormack attempts to sort through the complexities of science--real and ideal, masculine and feminine--we think it would be more fruitful to examine the place science historically occupies in societies and the manner in which it reflects and implements the values of the times and places of which it is a part.

Both Sayre and McCormack claim that male prejudice against women scientists lay at the root of Franklin's abuse. To establish the truth of this assertion and to give it historical significance, we must consider Franklin's case in the context of women's place in the scientific professions. Otherwise we are left with the idiosyncracies of a single instance which may simply be the result of a clash of personalities or other factors of no great social or historical consequence. For example, we might begin by asking where women scientists have been discriminated against and where they have been accepted. Franklin herself spent three happy and productive years in a laboratory in Paris where she was warmly received and intellectually respected. Was there a difference between the structure and social relations of English and French laboratories? Has the treatment of women in such circumstances varied over time? McCormack's own experience indicates that women's scientific talents were called upon during World War II: was support withdrawn after the emergency? Was discrimination against women linked to male prejudice against women in higher education, as Margaret Rossiter has shown to be the case between 1900 and 1920 in the United States?(3) Sociological studies of women's role in science in the contemporary United States point to three areas in which women face hindrances in seeking a career in science. Prevailing social attitudes about their competence and the "appropriateness" of science as a career for women tend to limit the

number of women who pursue scientific careers in the first place and to produce in those who do an ambivalent feeling about their work, resulting in lower productivity than among male colleagues. More pertinent to the Franklin case is evidence that in the United States women suffer from discrimination in the form of lower salaries and slower professional advancement than men.(4) Did similar factors prevail in Britain in the early 1950's? One would suspect an affirmative answer, given certain superficial facts such as the existence of a lunchroom for men only at King's College at the time Franklin worked there.

A further problem for historians is whether issues about women fall into the traditional categories of historical scholarship or whether they raise entirely new questions that call for new categories of analysis. Sayre's book is merely responsive to Watson's judgments of Franklin. Watson said that Franklin did not wear lipstick; Sayre responds that she did. Watson found her cold; Sayre describes her warmth and presence. Watson decried her achievement; Sayre attempts to resurrect her scholarly reputation. Fair enough; but Watson's book need not be taken as "a reliable picture of how scientists work," nor need Sayre's.(5)

More to the point, serious consideration of the place of women in science requires that we ask questions that go beyond the categories of Watson's judgment. Does the historical or social position of women in the sciences invite us to look at the history of science from a new vantage point? Instead of asking the traditional questions about important scientific discoveries--who made the discovery? out of what intellectual tradition did the problem emerge? what train of thoughts, theory and observation led to the discovery?--perhaps the situation of women in science, and the Franklin case in particular, lead us to an entirely different range of questions --what social factors determine who enters particular professions? how are prevailing social values and attitudes reflected in the inner workings of a profession? why are certain fields at certain times more amply funded than others? who makes decisions about funding? professional advancement? on what grounds?

It is clear that certain occupations at particular times are defined as incompatible with women's other roles. Men's work tends to be most highly regarded and well paid; presently, within academia, the sciences are most esteemed since they attract the most funding. In 1960 women represented only 4.2% of physicists;(6)clearly something about their socialization or men's socialization or about support structures or funding agencies hindered women's entrance into physics. On the other hand, they comprised 26.4% of mathematicians; how to understand that? Mathematics is surely as abstract, logical and linear as theoretical

physics, yet women--intuitive, service-oriented and all the rest of it --are mathematicians. Is it because for mathematics you need only a piece of paper and a pencil, while for physics you need massive equipment which is not mobile and prevents a women from following her husband? Is it because girls are not given erector sets to play with? To what extent is mythology about women's nature and capacities a factor in determining the acceptance of women into the professions? The two books under discussion point to these mythologies as influencing Watson's judgement of Franklin and her work. Here again, one must ask why Watson, raised in a particular time and place, held one set of attitudes, while it would appear that Franklin's French colleagues held a different set of assumptions about women's creativity?

To move beyond the specifics of the Franklin case toward an analysis of the place of women in the sciences, we must view the role of women against the background of relationships in the academic setting which are often determined by power and position. Women are not the only members of the scientific community who are unjustly abused. Studies of the education of scientists in the universities, of competition among scientists for status and position and of the dependence of scientists on granting agencies for their existence as researchers point to the systematic exploitation of graduate students and post-doctoral fellows for the advancement of their professors. For example, examination of the authorship of multiple-authored articles, a virtually universal practice in the contemporary sciences, will reveal that more often than not the credit for the student's research is conferred upon his professor by virtue of giving the latter senior authorship of the article. This practice may not constitute the outright act of stealing data that Maurice Wilkins allegedly committed against Rosalind Franklin but it is no more honourable than his act and sets the moral tone for the entire scientific community.

Stealing per se is not without precedent in the history of science. Recent cases, such as the Summerlin case in immunology, reveal that scientists, in desperate efforts to forward their careers, may even resort to falsifying data.(8) Summerlin's motive was apparently related to the pressure to obtain grants for his research. Such violations of the canons of intellectual honesty and scientific research should provoke historians to inquire more deeply into how science is supported, how scientists are educated and how criteria for advancement are applied.

While women have indeed been notoriously powerless in the sciences throughout the twentieth century, one must ask further about the socialization, the psychic prices paid, the careers unfulfilled, of the graduates in the sciences who forever remain somebody's assistant. The toll exacted of "unsuccessful" males

might provide an interesting control for understanding the true plight of women.

There is, then, more to the scandal of The Double Helix than either James Watson's defective character or Rosalind Franklin's mistreatment as a woman excluded by her colleagues. Science is not a pure and rational search for objective truth, unsullied by the mundane facts of power and money. It is instead a social activity which, like any other, reflects the values of the society of which it is a part. The position of women within the microcosm of the scientific professions is a product of these wider social values. Ruthless competitiveness, hierarchical institutions and at best ambivalent attitudes about the suitability of women for the life of science pervade the scientific arena as they do society at large. Viewed in its historical context, the case of Rosalind Franklin takes on its proper significance.

NOTES

1. Atlantis, Fall 1976, vol. 2, number 1, pp. 107-113.
2. Ibid., p. 107.
3. Margaret W. Rossiter, "Women Scientists in America before 1920," American Scientist, 1974, vol. 62, pp. 312-323.
4. Harriet Zuckerman and Jonathan R. Cole, "Women in American Science," Minerva, 1975, vol. 13, pp. 82-102.
5. Thelma McCormack, p. 112.
6. Cynthia Epstein, Woman's Place: Options and Limits in Professional Careers (Berkeley: University of California Press, 1970), p. 7.
7. Anne Sayre, Rosalind Franklin and DNA (New York: Norton and Company, 1975), pp. 70-71.
8. In 1973, Dr. William Summerlin of the Sloan-Kettering Institute of New York reported that "tissue culture" could make a skin or corneal graft that would otherwise be rejected acceptable to an organism of the same or even different species. His claims aroused considerable interest because of their implications for surgical practice. When other scientists failed to duplicate his results, Summerlin resorted to faking his data. He touched up his grafts with a felt pen so that it would appear that he had grafted dark skin onto white mice. He also reported experiments that had never been performed. See P.B. Medawar, "The Strange Case of the Spotted Mice," New York Review of Books, vol. 23, number 6, April 15, 1976, pp. 6-11.

Elinor J. Burwell A COMMENT ON PATRICK O'NEILL'S REVIEW OF HALF THE HUMAN EXPERIENCE

A book review should, as a minimum, inform the reader about the contents of the book. Patrick O'Neill's review in the Fall 1976 issue of Atlantis(1)of Half the Human Experience, by Hyde and Rosenberg,(2)fails to accomplish this minimum. O'Neill has focussed almost exclusively on the book's presentation of Freud's thecry of the female personality, a sectiон which covers only seven of the book's 306 pages.

The academic psychologist who teaches a course on the psychology of women wants information on how this book compares with previously published texts. The fact that there are good chapters on lesbianism and on cross-cultural aspects of sex roles is of interest, since these topics are absent in both the Bardwick(3)and Sherman(4)texts. The new and exciting concept of androgyny is discussed. There is a good section on methodological problems in research on sex differences. There is even a chapter on sex differences in animal behaviour for those who are "into" comparative psychology. Following an account of the psychology of black women, the concept of women as a minority group is introduced. The chapters on biological influences on female behaviour and on female sexuality give the main points on these topics clearly and concisely. One might complain that Hyde and Rosenberg stick too closely to