Atlantis Vol. 11 No. 1
Fall/Automne 1985

The Status of some Canadian Women PhD Scientists

Anne Innis Dagg
University of Waterloo

In the second half of the 1970s, prospective scientists, and women scientists in particular, were faced with a confusing picture. The universities were urging more students to go into graduate work with the implication that jobs were available, yet a number of scientists who already had their PhDs were unable to find work.

The push for more graduate students at Canadian universities was widespread and intensive. For example, Dr. J. K. Morton, Chairperson of the Biology Department at the University of Waterloo, wrote in 1978: "Any suggestion that this country is overproducing PhDs in the biological sciences is nonsense; we are not. The jobs are there but qualified Canadians to fill them are not." (University of Waterloo *Gazette*, Jan. 4, 1978.)

The Biological Council of Canada in that same year pronounced that, "Over the next 5-10 years, career opportunities for scientists at the doctoral level will be highly competitive and insufficient to meet the demand." Mettrick and Walden (1978) who prepared this report did note, however, that not everyone agreed with their forecast. They wrote, "we question MOSST's (Ministry of State for Science and Technology) assumption that there is an overall surplus of Ph.D.s in the natural sciences which is as high as 36% in certain fields." At that time, hundreds of scientists with PhDs were being produced each year, yet perusal of journals and newspapers showed that few universities and few other employers were hiring scientists.

In 1978, Dr. W. G. Henry, head of the Metallurgical Engineering Department at Queen's University, also wrote that more PhDs should be produced, but he admitted that there were few jobs. He advised academics to point out to their students "that there is nothing wrong with being a temporarily unemployed PhD" (*Science Forum* Nov.-Dec., 1978). He did not point out that such unemployment was sometimes permanent, not temporary. Indeed, in that year about 1,000 biologists, many with doctorates, applied for work in the Ontario government's fish and wildlife departments (information from D. Roseborough, Ministry of Natural Resources); a recent survey had found that there would be no jobs for most of the entomologists being trained (*Research and Development Bulletin*, Dec. 1977); universities were not hiring additional faculty but were often firing faculty instead; and government cutbacks were jeopardizing the employment of

government and private-sector scientists, including those on contract work.

Because of this publicity to encourage graduate students at a time when many of the scientists we knew could not find work, Dr. Rita Wensler and I in 1978 founded a lobbying group of unemployed/underemployed Canadian doctoral scientists. We felt that university professors were interested more in having research done under their direction by poorly paid graduate students than in the future career of these students. When we sent out publicity about this new lobbying group to universities across Canada, we received several letters by professors who insisted that more doctoral scientists were needed in Canada. Prof. P. A. Larkin, of the Institute of Animal Resource Ecology at the University of British Columbia, feared that "by 1985 Canada could be shopping again abroad for scientists because the number entering Ph.D. programs now is declining" (letter of Nov. 7, 1978).

Despite the optimistic picture painted for scientists by these professors, about 20 scientists who were unable to find permanent work in their disciplines contacted us. Some had turned to other fields, training as teachers and librarians; some were working at short-term, poorly paid post-doctoral positions; and others were without work, or working part-time and/or in other disciplines. One Canadian woman biologist in 1979 had written to over 100 institutions and companies requesting work, but found none. She then accepted a post-doctoral research job which paid far less than graduates with Bachelor's degrees received in other fields.

Although some trained men were unable to find suitable scientific work in the late 1970s, most of our contacts were women. It seemed to us that, although there were many fewer women than men scientists with PhDs, women were disproportionately more likely than men to be un/underemployed. Although in the early 1970s, many reports were produced showing that few women scientists had been hired at various Canadian universities, little was done by these universities. Indeed, whereas in Canada 4.7 percent of the faculty were women in the mathematical and physical sciences in 1965-66, their percentage had decreased in 1975-76 to only 3.6 percent (Symons and Page, 1984). Nor were other groups open to hiring women scientists; for example, compared to their male counterparts, women physicists in America experienced five times as much unemployment, were paid less, and worked in positions of lesser rank (Branscomb, 1979).

To try to clarify the status of Canadian women scientists, in 1981, I collected data on women science professors in Ontario and in Canada, and analyzed information from questionnaires filled out by women scientists, most of whom had their doctorates.

I. Women Science Professors in Ontario and Canadian Universities

I wrote in May, 1981, to the Deans of the Faculties of Science in Ontario universities asking them for the number of female assistant, associate and full professors in the departments of Chemistry, Physics, Geology (Earth Science) and Biology (Botany/Zoology). For each university, I also added up from its 1981-82 calendar the total number of professors in each of these departments in order to ascertain the percentage of women professors. From the *Commonwealth Universities Yearbook 1982*, which lists male professors by their initials and female professors by a first name, I added up the number of female and male professors in the three professorial ranks at the 46 universities in Canada which have at least two of these science departments.

II. Status of Women Scientists

A one-page questionnaire was devised for women scientists, centering on their work record

and on possible discrimination they had encountered (Appendix A). This and a covering lettter were sent primarily to graduates of the University of Toronto. Because it was against this university's policy to release the names and addresses of its alumnae, it was difficult to determine which type of scientists would be mailed the questionnaire I had forwarded to the university. They were, therefore, sent to all the women PhDs whose addresses were known who had graduated since 1950 from the School of Graduate Studies' Division III (Physical Sciences) and Division IV (Life Sciences). These included 40 departments or units. The respondents came from a number of different disciplines which were grouped as follows to make the analysis feasible:

Biology (including Medical Science),
Chemistry/Nutrition (including Pharmacology),
Psychology, and
Physics/Mathematics/Engineering (including Astronomy)

In addition to the 160 University of Toronto scientist alumnae, questionnaires were also sent to:

(a) the six PhD women science graduates from the University of Waterloo, whose responses were grouped with those from the University of Toronto,
(b) a random sample of 20 women professors in science-related fields presently employed at Ontario universities, and
(c) ten distinguished women scientists in natural science (biology and geology) chosen by the National Museums of Canada to be honoured for International Women's Year in 1975.

Results

I. Women Science Professors in Ontario and Canadian Universities

As is evident in Table Ia, there are few women scientists in the 15 Ontario universities, and relatively fewer in the higher ranks. Laurentian University, University of Windsor, and Wilfrid Laurier University did not have any female professors in their science faculties.

When I calculated the percentage of women scientists in universities throughout Canada from the *Commonwealth Universities Yearbook 1982*, I noted two women scientists whose names were given as initials, making them thus seem to be men. Despite these and possibly other errors, the percentage of women science professors for all professorial ranks grouped together for Ontario universities were similar when the two methods of collecting the data are compared (Table Ia). Because of this similarity, we can assume that the data for all universities in Canada, gathered from the *Commonwealth Universities Yearbook 1982*, are also more or less accurate (Table Ib). Thus it is apparent that women science professors are approximately as rare in universities across Canada as they are in Ontario universities. Some non-Ontario universities also apparently lack any women science professors.

II. Status of Women Scientists

A summary of the responses to the questionnaire is given in Table II, with comments noted under the following headings: Retraining; Continuance of Work Record; Distinguished Women Scientists; Sexual Discrimination — a) Sexual Discrimination and University Students; b) Sexual Discrimination against Women Professors; c) Sexual Discrimination in the Non-University Work Force.

Several of the respondents were worried about anonymity. One commented "Although the letter you wrote promises anonymity, the first two answers in the questionnaire (date PhD received and in what discipline) would readily identify

TABLE I
Women Science Professors at Ontario and Canadian Universities, and Percentages of Professors in Professorial Ranks

a. Women Science Professors at Ontario Universities, 1981-1982

	Total Number	Percentage of Professors who are Women: Full Professor	Associate Professor	Assistant Professor	All Professors
Biology	471[1]	5%	9%	14%	8%
(Botany/Zoology)	412[2]	5%	8%	5%	6%
Chemistry	341	2%	2%	5%	2%
	316	1%	2%	15%	3%
Geology	178	0%	2%	4%	2%
	170	0%	2%	0%	1%
Physics	338	1%	1%	5%	1%
	339	—*	1%	0%	1%

[1] First rows of data are from the universities themselves.
[2] Second rows of data are from the *Commonwealth Universities Yearbook 1982.*
—* means more than 0 but less than .5%.

b. Women Science Professors at Canadian Universities
Data from *Commonwealth Universities Yearbook 1982*

Biology	928	5%	8%	7%	7%
Chemistry	847	1%	2%	11%	2%
Geology	370	—	3%	2%	1%
Physics	829	—	1%	3%	1%

me!" For this reason, the comments of various scientists are identified at most only by general discipline and decade, rather than the actual year and specific field in which the PhD was awarded.

Another wrote "I think you are *obligated* to explain why you are requesting this information and *how* you plan to use it. Anonymity is not sufficient inducement to supply accurate information." This woman did comment about discrimination: "underranked, underpaid, less committee work, contributions not recognized as easily as male counterparts." It is impossible to know if she or other women possessed other pertinent information too sensitive or dangerous to include on their questionnaires. Since she did not include her name or address, I was unable to contact her.

Retraining

One-quarter of the Toronto and Waterloo graduates from all disciplines were either willing to retrain because they could not find a

suitable job, or had already retrained. Others were unwilling to retrain because they had found jobs in other fields which satisfied them, or because they could see little hope of employment in any field of science. A zoologist from the 1970s wrote:

> I have already spent too much time in training to be a scientist, and I am not willing to spend more time on it, which may still lead me to a dead end.

This women had worked as a scientist part-time for eight years for no pay.

A biochemist and two pharmacologists, from the 1970s, all had become doctors. One wrote:

> I am a medical doctor also (as well as a scientist) and have decided to get a licence to practise as I am unable to find a suitable job as a scientist.

One woman who graduated in the 1960s as a doctor when she was 42 was told by her dean that she was too old to practise medicine. He helped her find a research job at a hospital, but to get ahead there, she was told she needed a PhD, which she subsequently earned. The hospital later dismissed her from the research job she held for 11 years:

> I felt very depressed when I was tossed out of (the hospital) when in my 50s. It took a long time to get over it.

She then at last began to practise medicine. She wrote:

> I soon made more money than I ever would have in research. I have now enough saved so that I can do research for nothing. I have two offers.

One biologist (1970s) who had worked in research at the same Toronto hospital for five years was fortunate enough to be offered a job as a professor. She would not have taken another hospital job—"it's almost impossible for a PhD to move up in the system." She reported:

TABLE II
Information from Questionnaires Sent to Women Scientists

Replies	Number of Questionnaires Sent	Number of Questionnaires Returned		Number of Scientists Willing to Retrain	Number of Scientists who felt Discriminated Against* - in total	- at work	- at university	Number of Scientists who had no Gap in their Work Record
University of Toronto and Toronto PhDs								
Biology		27		8 (30%)	13 (48%)	8 (30%)	7 (26%)	16 (59%)
Chemistry/Nutrition	166	21		5 (24%)	5 (24%)	2 (10%)	4 (19%)	16 (76%)
Psychology		11	69 (42%)	2 (18%)	6 (55%)	4 (36%)	5 (45%)	8 (73%)
Physics/Mathematics/ Engineering		10		2 (20%)	4 (40%)	2 (20%)	3 (30%)	9 (90%)
Ontario Professors	20	16		N/A	8 (50%)	5 (31%)	4 (25%)	14 (88%)
Distinguished Scientists	10	9		N/A	5 (56%)	2 (22%)	3 (33%)	N/A
Total	196	94	(48%)	17 (25%)	41 (44%)	23 (24%)	26 (28%)	63 (74%)

* Some women reported sexual discrimination both at university and at work.

> I certainly didn't think that I or my work were taken very seriously at [the hospital] and encouragement was totally lacking, which seems to be rather common in the Toronto scientific community.

Another older woman now teaching science at a high school would like to retrain so that she could return to research (Zoology, 1950s).

Continuance of Work Record

A total of 63 women (74%) had worked steadily, usually full-time, since they obtained their PhDs. Of those who had not done so, many have been unable to find work. Several women commented that they had taken time off to raise children. One wrote:

> I was employed as a scientist (post doc) until I had my first child at which time I elected to stay at home. I may return to science when my children are in school (Botany, 1970s).

Another who had been unable to find full-time work stopped her part-time work to raise three children, and then switched fields when she returned to the work force (Chemistry, 1950s). A third who has changed fields is content not to work full-time:

> I have young children. I am agreeable to my present part-time position (Biology, 1970s).

Distinguished Women Scientists

Most of the women recognized in 1975 by the National Museums of Canada as outstanding scientists in natural history did not feel they had suffered from sexual discrimination, unless to a small extent in the past. One wrote:

> All my work has been amateur and performed alone. Nevertheless, I have received overwhelming recognition in many ways without trace of discrimination.

Another noted that, although she did research in the United States and helped students on university field trips, she received no money either then or later for her scientific research in Canada.

Sexual Discrimination

Some of the scientists were unsure if their gender had anything to do with being unemployed.

> How can one know whether sexual discrimination is involved in the hiring process. All one knows is that one never gets to the short list—never gets an interview ...(Zoology, 1970s).

Others felt that discrimination was all-pervasive:

> It is done in unwritten and unspoken ways and it is hard to pin down. In general, I would dare to comment that women scientists, especially *married ones* with a family, are victims of circumstances. (Zoology, 1970s).

Many of the scientists queried felt that they had never experienced sexual discrimination in their careers (Table II) and some added pertinent comments to their questionnaires. One in physics who obtained her PhD in the 1960s noted:

> It has been my experience that society as a whole perhaps discriminates, primarily in the roles set up for marriage partners (much less so now, however), but that scientists do not.

A fairly recent graduate in pharmacology wrote:

> Contrary to encountering sexual discrimination, I have had nothing but encouragement from my PhD supervisor (male) and my present supervisor (female). My

> organization has been extremely cooperative in letting me schedule my work around the needs of my family.

A 1960s chemist noted "definitely not!" beside the question about whether she had experienced sexual discrimination while employed as a scientist, while another chemist from the same period pointed out that there are few jobs "for *most* scientists who have graduated in the last decade regardless of whether they are male or female, e.g., NRC post-doctoral fellows." A physicist (1970s) wrote:

> I think you are on the wrong track. Since research jobs have been scarce over the last few years, *all* PhD graduates had problems finding jobs.

(a) Sexual Discrimination and University Students

More women noted having experienced sexual discrimination at universities (28%) than in the non-university work force (24%—Table II), but this may have been because all the women had been through universities, whereas many had not worked as scientists elsewhere.

No one commented that her marks at university were based on anything but ability, but a number of women, especially older ones, were dissatisfied with how they had been treated. A psychologist (1960s) wrote that, although she had never encountered overt sexual discrimination,

> since my university days as a student I have become aware of the nonconscious forms of discrimination which all women face in our society whether we realize it or not.

One biochemist (1950s) wrote:

> Some professors at the undergraduate level did not encourage women, indeed were very negative. Some were insensitive enough to use women as the butt of jokes.

A psychologist (1950s) noted:

> Perhaps if I had not been a woman, my professors might have more actively encouraged me as I was one of their best students.

Another psychologist twenty years later wrote:

> I had three female professors who helped me tremendously either by being role models or in more overt ways.

One food chemist (1950s) chose Home Economics as an undergraduate because of societal attitudes. She wrote:

> My choice of Home Economics was, to a considerable degree, an attempt to be in a field with some science component and not in competition with men.

Many women commented about sexist treatment of them while they were graduate students. A biochemist (1950s) wrote:

> Some graduate professors were unwilling to accept women as graduate students, suggesting that their training was a waste of time and money because women were assumed to be destined to non-professional life-times.

One woman PhD (1970s) experienced discrimination during post-graduate medical training:

> Less well qualified males selected preferentially for projects, experience, fellowship and social engagement.

Differential treatment because of gender is still present at universities, as four women who have obtained their doctorates since 1977 attest. One

psychologist wrote that sexual discrimination,

> was occasionally present at the verbal level (on the part of some of the older, more conservative faculty members who seemed to feel that women graduate students were not to be taken seriously since they dropped out more frequently). Female graduate students had to be *very* aggressive and demanding in order to be taken seriously.

A biophysicist experienced nepotism when she was told she would not be given a research associate position "due to boyfriend working in same department."

The experiences noted by the other recent women graduates were less clearcut.

A psychologist wrote:

> While I don't think I experienced any discrimination, I always felt that I had to conform to the "male student" models—i.e., wore jeans, hung around with "the boys," postponed pregnancy — which I thought would coincide with grad school.

Two women commented positively on their university years. One wrote, "Being a woman was more of an advantage than a disadvantage." This physicist (1970s) who felt that she could not endure years of "post-doc circuit" has never worked in physics. The other, a zoologist (1970s) noted, "I was treated very fairly in graduate school, both in scholarship and research matters." She was unable to find work in her doctoral field, but has since found work in a related field.

(b) Sexual Discrimination against Women Professors

Some women who are professors have complaints that are unfocussed:

> - Nothing very specific, just the usual feeling that somehow one has to be better to be considered equal (Zoology, 1960s).
> - Well, it was more a sense of isolation than anything. These things are very hard to document. Some remarks. Also promotions and recognition few, slow, grudging and far between. I guess I'm used to it! (Biology, 1970s).
> - I knew discrimination in job hunting, was offered lab tech jobs, on soft money, until I got my present appointment. Yet the students I trained got "regular" jobs; they were all male (Biology, pre-1960s).

A number of women professors were more explicitly aware of inferior treatment for women; sometimes sexual discrepancies have been corrected:

> - At the University of...women professors are paid consistently less than men at the various ranks. But the greatest discrimination has come from a chairman (female) who is a "queen bee!" (Botany, 1950's).
> - My salary was lower than that of comparable colleagues. This was corrected in 1973 by...our university and I was given a "salary award" (Biology, 1960's).
> - [Salary initially was low] but this has recently been cleared up leaving of course a considerable loss during the early years of my employment (Biology, 1960s).
> - [Discrimination] only to extent of five years age discrimination for retirement of women—however this was rectified, but only after I had reached the age limit!—and had acted as department head for two years! (Zoology, pre-1960).

A number of women have apparently not been hired or given tenure by universities because they were women:

> - I applied for a position in 1974 but was not even asked for an interivew. I subse-

quently took the case to the Ontario Human Rights Commission, which found I had a better teaching record and a far better research record than the man the university had hired, but the Commission refused me a Board of Inquiry, stating that university cases were "too complex." I then instituted a Judicial Review against the Ontario Human Rights commission, but the Ontario Supreme Court judges ruled that no one had a legal right to a hearing under the present Ontario Human Rights Code. The university told me it might hire me the year I was passed over for the position, this time for a second opening, but instead it hired a man with only a Master's degree and it never advertised this second job. Both men now have tenure and therefore permanent jobs (Biology, 1960s).

- The university said it had decided not to fill the position it had advertized in the mid-1970s—yet soon after several men were hired—this was a good way to hire men rather than women without the women being able to complain (Biology, 1960s).
- I applied for a position once but my application was not considered. I later learned the departmental chairman had simply decided he wanted no more women. Among 15 or so men, there were already two women (Psychology, 1950s).
- In one department three women with doctorates were hired as assistant professors, then refused tenure in the 1970s and so lost our jobs. Men with less qualifications were given tenure... (Zoology, 1960s).
- Denied tenure under unusual circumstances - lower status than men - different teaching assignments (Psychology, 1970s).

c) Sexual Discrimination in the Non-University Work Force

The comments about discrimination were as varied for the non-university work force as they were for professors.

- pay (Psychology, 1960s).
- Only discrimination in hiring practices and wages—once on the job this was not seen (Biology, 1970s).
- An inquiry into salaries a number of years ago revealed the need to raise mine to bring into line with male counterpart (Biology, 1970s).
- Mainly experienced discrimination from male peers, not from employer. Discrimination is probably not the correct word here, it is more a male tendency not to value a female opinion as much as another male opinion (Zoology, 1970s).
- My input on technical matters was not sought or was not taken seriously by my business partners. Eventually, I proved my capabilities and these problems were relieved (Engineering, 1970s).

Discussion

In the late 1970s Canadian universities were urging science students to take PhDs, arguing or implying that there were jobs available for such highly-trained people. However, at that time and currently there are few suitable openings for scientists with doctorates, even though at least two professors predicted that by now Canadian scientists would be in great demand.

Although jobs for all highly-trained scientists are in short supply, women particularly have had a difficult time finding permanent jobs. Universities have traditionally hired large numbers of doctoral graduates as professors, but science departments especially have hired few women, even though many have applied for positions. The percentage of women with PhDs form a pool that seems to be at least twice as great as the percentage of women hired as professors (Table III). Some universities have refused to hire a single woman scientist; some departments which have no or at most one woman professor have refused to even interview women applicants. Women who responded to the question-

naire have encountered a variety of forms of primary discrimination by Canadian universities. Such sexual discrimination means that although universities are willing to train women as graduate students, they are usually unwilling to hire the women scientists they train. This means in turn that women students interested in science seldom have role models to follow and may decide against pursuing a career in science for that reason.

One measure of the difficulty women scientists have in finding work is the large number who have retrained or would be willing to do so. All students work hard to obtain a PhD, and the necessity of then going back to study again in a new discipline is appalling, both in personal cost and in government expense. It costs at least $100,000 in government funds to train a PhD in science, yet much of this money is wasted if there are no jobs for graduates to take. Several respondents found that it was better to train as a doctor than as a PhD, because then at least one could work for oneself; as PhDs, many women were unable to find any job and thus to earn any money in science.

The dedication of women to science is illustrated by the number who have worked for years or even a lifetime without pay, and the large percentage who have worked all their lives. Only a few mentioned the problems that having children posed for them, and these women had found satisfactory arrangements possible in caring for them.

It is heartening that the distinguished women scientists contacted did not feel that their careers had been hampered because they were women, although some had encountered sexual discrimination. It is noteworthy that some of these women had worked entirely on their own in carrying out research projects, without funding or outside help. It is almost impossible to imagine top male scientists having to work under such conditions.

It is perhaps reflective of women's expectations that none of the 16 Ontario professors contacted felt she was at present discriminated against by her university, even though Boyd (1979) found that if men and women professors had the same qualifications, the man would be paid considerably more than the woman. Symons and Page (1984) reported that for 1980-81 that the median salary for university teachers in Canada was over $7,000 less for women than for men in the agricultural and biological sciences, and nearly $10,000 less in the mathematics and physical sciences.

Discrimination in universities can either be by primary sexism, which is unfair discrimination on the basis of sex, or by secondary sexism, which involves sex-correlated factors or criteria which have an unfair impact on some women (Warren, 1977). Warren lists nine types of secondary sexism in hiring which include, regardless of merit of the applicants, giving a job to the person who has the greatest financial need, giving preference to candidates who have the least interrupted work records, and choosing people who are judged least likely to have to move from an area because a spouse changes jobs. To overcome such discrimination, it is probably necessary to have goals in university hiring, either impartial or preferential (Ezorsky, 1977). Impartial hiring involves present and future hiring of the same ratio of trained women as there are in the pool of trained academics in any one discipline. Eventually, as professors retire, past inequalities will be overcome. Preferential hiring, which means hiring a greater proportion of women than are present in the the trained pool, will remedy past imbalances between the sexes more quickly. Such affirmative action programs would be of little use even if they were established, however, because there are so few professors currently being hired in Canadian universities. Groarke (1983) points out that further measures such as increased university funding or changes in tenure and retirement policies would

be necessary to ensure an equitable number of women professors in the foreseeable future.

Although it is difficult to obtain statistics on the number of women scientists in Canada who would like to be professors, it seems certain that the universities have hired relatively fewer women as professors than there have been in the trained pool of scientists. In 1965-66, for example, Robson and Lapointe (1971) noted that the percentage of "females in each field" was 10.4 percent in pure biological sciences and 4.7 percent in pure physical sciences, notably more than the percentage of women professors even today. Further data given in Table III indicate that trained women have been available for many years, but almost none have been hired by universities (Table I). Universities often claim that they are not at fault for their disproportionately small number of female science professors compared to those women who have PhDs (Vickers and Adams, 1977). Many male professors say that they would be willing to hire women, but none apply who are suitable. One professor has even argued that since fewer women than men apply for each job, statistically women should not expect to get hired. (If this approach were general, no women would ever get hired). On the other hand, many women scientists feel they are denied jobs because they are women and that universities are less interested in hiring the best scientists available than in hiring men, as their comments on the questionnaires show.

TABLE III
Percentage of Canadian Doctoral Degrees in Science Awarded to Women

Discipline	*1969-70*[1] Total Number of PhDs Awarded	*1969-70*[1] Percentage Awarded to Women	*1975*[2] Total Number of PhDs Awarded	*1975*[2] Percentage Awarded to Women
Biology Chemistry and Biochemistry	126 240	10% 3%	159 197	17% 13%
Geology	37	0%	34	3%
Physics	123	4%	108	4%

[1] From Statistics Canada, 1971.
[2] From Statistics Canada, 1977.

There seems little doubt that Canadian universities are providing little opportunity for women scientists both directly by hiring so few, and indirectly by having few role models to encourage women students in scientific careers. Devereaux and Rechnitzer (1980) reported that in 1976 in Canada 839 women received bachelor's degrees in biology, 36 percent of those awarded. In the same year 91 women received master's degrees in agricultural and biological sciences, 27 percent of those awarded, while the number of women who received doctorates in these sciences was too small to be included. Recent efforts to produce more women scientists in Canada have concentrated on persuading high school girls not to drop mathematics and science subjects from their curricula (Science Council of Canada's workshop published in 1982 as *Who Turns the Wheel*; University of Guelph, February 1985 conference "Women and Science"). It may be that women are refusing to continue into graduate work in science because they do not feel they have a reasonable chance of finding work even if they do earn their PhD.

Canadians have not been attuned to the number of women scientists in part because of the way statistics on the subject have been presented. In Devereaux and Rechnitzer's study, for example, the number of doctoral degree recipients were pooled into an engineering, mathematics and physical sciences category and into an agricultural and biological sciences category. In no table are figures for women given for these two groupings, because they are said to be too small (although not zero). Yet 170 doctoral degrees were awarded to women in 1976, only 73 percent to specified categories—humanities and social

sciences. We are given no information on 46 women scholars who received doctorates, a number of whom are undoubtedly scientists judging from Table III.

As another example, Symons and Page (1984) give the percentage of women as full-time science teachers in Canadian universities, but not for science professors. Since relatively many women but few men work as instructors and lecturers, the number of women teachers is a much larger percentage than the number of women professors. Non-professors and professors when grouped together disguise the fact that the former, who tend to be women, tend to be poorly paid, to lack tenure, to have no academic power, and to be unable to apply for grants. None of these disabilities tend to apply to professors who are almost all men.

As well as the above, studies of the number of qualified women who apply for university positions and the number who receive them are so difficult to carry out that they have not been attempted. Rather, research is concentrated on the rank and salary of women versus men actually employed at universities (as Boyd, 1979). It seems to be tacitly assumed from this that the problems women face do not necessarily involve being hired.

BIBLIOGRAPHY

Boyd, Monica. *Rank and Salary Differentials in the 1970s: A Comparison of Male and Female Full-Time Teachers in Canadian Universities and Colleges.* Association of Universities and Colleges of Canada, 1979.

Branscombe, Lewis M. 'Women in Science.' *Science* 205, 4408: 751, 1979.

Commonwealth Universities Yearbook 1982. Association of Commonwealth Universities, 1982.

Devereaux, M.S. and Rechnitzer, Edith. *Higher Education - Hired? Sex Differences in Employment Characteristics of 1976 Postsecondary Graduates.* Statistics Canada, 1980.

Ezorsky, Gertrude. 'Hiring Women Faculty.' *Philosophy and Public Affairs* 7: 82-91, 1977.

Groarke, Leo. 'Beyond Affirmative Action.' *Atlantis* 9:1, 13-24, 1983.

Mettrick, D.F. and Walden, D.B. *Biology, Biologists and Government.* Biological Council of Canada, 1978.

Robson, R.A.H. and Lapointe, Mireille. *A Comparison of Men's and Women's Salaries and Employment Fringe Benefits in the Academic Profession.* Canadian Association of University Teachers, 1971.

Science Council of Canada. *Who Turns the Wheel?* January, 1982.

Statistics Canada. *Degrees, Diplomas and Certificates Awarded by Universities 1969-70,* 1971.

Statistics Canada. *Degrees, Diplomas and Certificates Awarded by Universities 1975,* 1977.

Symons, Thomas H.B. and Page, James E. *Some Questions of Balance: Human Resources, Higher Education and Canadian Studies.* Association of Universities and Colleges of Canada, 1984.

Vickers, Jill McCalla and Adam, June. *But Can You Type?!* Canadian Association of University Teachers, 1977.

Warren, Mary Anne. 'Secondary Sexism and Quota Hiring.' *Philosophy and Public Affairs* 6: 240-61, 1977.

APPENDIX A

Questionnaire for Women Scientists

1. When did you receive your PhD? .....

2. a. In what science was it? (i.e. physics, chemistry, geology, botany, or zoology?) .....

   b. In what specific field? .....

3. Since obtaining your PhD, have you worked as a scientist for money? If so, for how many years?

   Part-time ..... Full-time .....

4. If you have not done so, would you have liked to have worked as a scientist

   part-time ..... full-time .....

5. If you are not satisfactorily employed at present, would you be willing to retrain so you could have a suitable job as a scientist? .....

6. Did you experience sexual discrimination while in University? Yes ..... No .....

   If yes, give brief details

   .....

   .....

   .....

7. Did you experience sexual discrimination while employed as a qualified scientist? Yes ..... No .....

   If yes, give brief details

   .....

   .....

   .....

Thank you for your help. Please return in the enclosed envelope. Please add any comments on the back of this page.