File

Association for Women in Mathematics

Volume 10, Number 4 NEWSLETTER July-August 1980

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PRESIDENT'S REPORT

Summer meeting. The 1980 summer meeting will be held at the Joint Mathematics Meetings at the University of Michigan at Ann Arbor. AWM events include:

Symposium on the life and work of Anna Johnson Pell Wheeler
Wednesday, August 20, 3 p.m.
Moderator: Bettye Anne Case
Speakers to include: Louise Grinstein, Paul Campbell, Ruth McKee, Nancy Owens.

Open membership meeting
Wednesday, August 20, 4 p.m.

Party, Thursday, August 21, 9 p.m. at Mary Markley Hall.

Locations of the symposium and of the open membership meeting will be announced in the Notices of the AMS. Volunteers are needed for the AWM table. If you are interested, contact Bettye Anne Case.

AWM elections. The nominating committee has nominated the following candidates for the fall elections. We will be electing a treasurer, and two at-large executive committee members. Members are welcome to make additional nominations by August 21.

Nominee for treasurer: Donna Beers, Wellesley College (incumbent)
Nominees for at-large executive board members:
Bettye Anne Case, Tallahassee Community College (incumbent)
Linda Keen, Lehmann College, City University of New York
Jill Mesirov, Institute for Defense Analysis (incumbent)
Judith Prewitt, National Institutes of Health.

Olympiads. Over the past two years we have been hearing rumors of irregularities and outright sexism in the choosing and training of the American math olympiad teams. Joan Hutchinson investigated the situation and found that certain events do admit a sexist interpretation, although other interpretations are given by the folks in charge. Nuances and sensitivity are important in training high school kids, and I am therefore writing a letter to the Olympiad sponsors expressing our concern.

As an organization, we need to be more involved with talented high school students. I will be happy to send congratulatory letters to girls who do well in local or national math contests. Just let me know their names and addresses and what their accomplishments are. There seems to be a paucity of female staff at summer math workshops for high school kids. Perhaps some of our members would like to get involved.

Good news. Still on the high school front, Lisa Joy Randall of Fresh Meadows, New York, tied for first place in the Westinghouse science scholarship contest. Her project was in number theory. Karen Lisa Jerome of Brooklyn, New York, was a second alternate, also with a project in mathematics.

Further up the academic ladder, Dr. Chuu-Lian Terng is one of this year's Sloan Fellows.

Bad news. No woman was awarded an NSF post-doctoral fellowship in mathematics this year, the first year of this award. And this year no woman was offered an AMS post-doctoral fellowship, nor did any woman receive honorable mention. This is a striking change from the pattern of the last few years.

Ending on a pleasant note. Alice Schafer, our past past president, was honored by a symposium held at Wellesley College on April 26 to mark her retirement. Mathematical talks were given by I.N. Herstein and Bhama Srinivasan (our president-elect). Bhama presented Alice with a card, and I sent the following telegram:

"I know that I speak for all members of the Association for Women in Mathematics in expressing deep appreciation for the important work that you have done and will continue to do for the community of women mathematicians, and for your tireless efforts on our behalf."

Alice, thank you.

Judy Roitman
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LETTER FROM THE EDITOR

The questionnaires are out to the AMS candidates. The answers from the candidates and endorsements from the AWM Executive Committee will appear in the September-October issue of the Newsletter. Remember to hang onto your ballot until you get your Newsletter!

The article by Ethel Ward McLemore in the November-December 1979 issue referred to a woman president of the Society of Industrial and Applied Mathematics. Actually, she was thinking of Maxine L. Rockoff, who was Chairman of the SIAM Board of Trustees in 1978. As current SIAM president Richard C. DiPrima has pointed out to us, there has never been a woman president of SIAM. Also, McLemore's biographical data were incorrect. Although she has retired from teaching, she has never taught at the University of Texas at Dallas and so is not a professor emeritus there. She is currently a consulting geophysicist. She has worked with the Geological Information Library of Dallas which is affiliated with UTD.

The Making of a Feminist: Early Journals and Letters of M. Carey Thomas, edited by Marjorie Housepian Dobkin, Kent State University Press 1979

June 21, 1870 - "...People seem to think that girls don't want any fun, and even if they do they want to row and climb they are shocked and say it isn't LADYLIKE but P and I are going to resist to the last!! After dinner mother let us take a ride in the carriage. I tell you we astonished the natives. ...After [riding around town] we got up on the stable roof and couldn't get down and as we had white dresses on every body stared. We got down with a determination not to get on roof where we would be seen. It was very embarasing [sic].

August 30, 1880 - from a letter to a friend on her engagement - "...I cannot help being grieved to see another woman with a fair chance for success and influence give it up. ...I think that every girl falls in love with one of the first two or three men who have ever fallen in love with her. ...If she does not yield to it and devotes herself to other things she is as sure to get over it as men are. ...I do not think there is a man who realizes that liberty and money independence and 'life work' are as much to a woman as to himself. Every time I have expressed this to a man he says 'is it possible for women

to feel so. I always thought that a girl when she fell in love gave up all that and considered her husband's work hers.'"

Thomas, first Dean and then President of Bryn Mawr College, comes across in this volume as vital, dedicated, ardent in her feminism - also as headstrong, single-minded, manipulative. Many of her comments sound so current that it is jarring to find references to Swinburne, Ellen Terry, Walt Whitman as contemporaries. I'm hoping for a second volume covering her career at Bryn Mawr.

Miriam Yevick sent in the interesting passages below. She points out that Katia Pringsheim Mann, the wife of Thomas Mann, was the daughter of the eminent mathematician and was herself a student of mathematics until her marriage. The excerpts are from pages 224-225 and 286 of Royal Highness by Thomas Mann, translated by A. Cecil Curtis, and reprinted by permission of the copyright holder, Alfred A. Knopf, Inc.

"'Uncommonly early. But in the second place I am rather busy with my innocent studies, as you saw. "I've got a lecture at eleven o'clock.'

'No,' he cried, 'to-day you must not grind at algebra, Miss Imma; you must not play in the vacuum, as you put it! Look at the sun! . . .May I?...' And he went to the table and took up the notebook.

What he saw made his head swim. A fantastic hocus-pocus, a witches' sabbath of abbreviated symbols, written in a childish round hand which was the obvious result of Miss Spoelmann's peculiar way of holding her pen, covered the pages. There were Greek and Latin letters of various heights, crossed and cancelled, arranged above and below cross lines, covered by other lines, enclosed in round brackets, formulated in square brackets. Single letters, pushed forward like sentries, kept guard above the main bodies. Cabalistic signs, quite unintelligible to the lay mind, cast their arms round letters and ciphers, while fractions stood in front of them and ciphers and letters hovered round their tops and bottoms. Strange syllables, abbreviations of mysterious words, were scattered everywhere, and between the columns were written sentences and remarks in ordinary language, whose sense was equally beyond the normal intelligence, and conveyed no more to the reader than an incantation.

Klaus Heinrich looked at the slight form, which stood by him in the shimmering frock, becurtained by her dark hair, and in whose little head all this lived and meant something. He said, 'Can you really waste a lovely morning over all this God-forsaken stuff?'

A glance of anger met him from her big eyes. Then she answered with a pout:

'Your Highness seems to wish to excuse yourself for the want of intelligence you recently displayed with regard to your own exalted calling.'

'No,' he said, 'not so!' I give you my word that I respect your studies most highly. I grant that they bother me, I could never understand anything of that sort. I also grant that today I feel some resentment against them, as they seem likely to prevent us from going for a ride.'"

"It displeased him to hear that she had been working, poring over algebra and playing in the lofty spheres since they had last met. He would beg her to lay her books aside now, as they might distract her and divert her from the matter to which all her thinking powers must now be devoted. He talked also about himself, about that sobering effect and awkwardness which, according to her, his existence inspired; he tried to explain it, and in doing so to weaken it. He spoke about the cold, stern, and barren existence which had been his hitherto, he described to her how everybody had always flocked to gaze at him, while it had been his lofty calling to show himself and to be gazed at, a much more difficult task. He did his best to make her recognize that the remedy for that which caused him to prevent the poor Countess from drivelling and to estrange her to his own sorrow, that the remedy could be found in her, only in her, and was given over absolutely into her hands."

These passages remind me of a project I often get as far as contemplating (someday I really will start copying out the quotes). While reading, be it "literature" or murder mysteries or science fiction, I run across passages about women mathematicians and scientists in particular and, more generally, comments about mathematics and science

and their pursuit. Infrequently an author seems actually to have studied some mathematics (I once found an accurate reference to Gödel's Incompleteness Theorem in a science fiction book), but more normally one sees that the average writer understands the average mathematician about as well as the average normal person does ("Oh, you're a mathematician? Okay, give me the square root of a million." - this one I collected at the softball diamond.). And the average woman mathematician comes across as very strange, indeed. It remains to be seen what Jill Clayburgh is going to do for our image.

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SECOND REPORT ON JOURNAL EDITORSHIPS

by Bhama Srinivasan, AWM president-elect, University of Illinois at Chicago Circle

My first report on journal editorships appeared in the AWM Newsletter of September-October 1979. Shortly before that Judy Roitman appointed me as Chairperson of a committee consisting of myself, Louise Hay, Linda Rothschild and Michele Vergne. In September 1979 we sent out a questionnaire to journal editors consisting of the following questions:

1. How are the members of the Editorial Board chosen? Are they chosen exclusively by the Editor-in-Chief, or is the responsibility shared by all the existing members of the Editorial Board? How is the decision to enlarge the Editorial Board and appoint new members made?
2. What are the prerequisites to being an editor of a journal? In other words, how would you rate your priorities as regards the desirable qualifications of the members of your Editorial Board? For example, you might consider mentioning qualities like "academic excellence", "administrative competence", "ability to choose the right referees", etc.
3. Does your journal receive any financial support from a university or any other institution?

The questionnaire was sent to 239 editors of about 30 journals, which were mostly Canadian and American; one foreign professional society and two European journals were included. I got 85 replies. Many of the replies were supportive of our objectives; Louise Hay made a quantitative survey of 68 replies and found that 28 were positive, 25 were neutral and 15 were negative.

The journals considered can be divided into 3 groups: (i) journals published by the AMS, (ii) journals published by commercial publishers, and (iii) journals published by a university or group of universities (e.g., Illinois Journal). In the case of the AMS journals, the selection procedures involve, at least in principle, the whole editorial board. For example, in the case of PAMS, the managing editor consults the editorial board when a vacancy occurs. In practice, however, an outgoing editor often suggests a replacement, and this is approved by the board. Our committee has written a letter to Peter Lax, the president of AMS, suggesting that there should be more outside input into the selection of candidates. In the case of journals in the category (ii) it would appear that the Editor-in-Chief has almost total responsibility in appointing editors. Furthermore, in most cases a member of the editorial board is there to stay until he/she retires, resigns, or dies (unlike in (i), where there is a fixed term of office). So in this case whether or not our efforts are successful depends entirely on the goodwill of the Editor-in-Chief concerned. In the category (iii) there was some variation in the procedures adopted by the journals and in any case the editorial boards tended to be small.

Finally, our efforts have yielded the following results. In 1977, when I first started correspondence with some of the journal editors, I surveyed 25 journals (in

category (ii)) and found that they had 459 editors of whom 9 were women. In 1980 the same journals have 10 more women editors, and at least 7 of these were appointed as a result of our correspondence. In addition there is a new woman editor of PAMS and the Editor-in-Chief of Communications in Algebra has indicated that he is inviting 3 more women to join his Editorial Board. We hope to continue our efforts by prodding the sympathetic editors.

MINUTES OF APRIL MEETING OF BOSTON AREA AWM

The Boston area chapter of AWM had a meeting on April 13, 1980 at AWM Clerk Martha Jaffe's house. The meeting was announced as a chance to meet members of the Executive Council and to discuss matters that concern us. We were fortunate to have lots of Executive Council members: past president Lenore Blum, in from California; Donna Beers (treasurer) and Alice Schafer, both from Wellesley College; and Rhonda Hughes, from Tufts.

Rhonda reported that she spoke at a symposium "Choices for Science" at the Bunting Institute; Jonathan Cole gave a controversial talk on his new book Fair Science: Women in the Scientific Community. She mentioned the difficulty in gathering "hard statistics" for use on these occasions because, after all, we primarily study mathematics, and not other mathematicians. Therefore it was agreed that AWM should have an Information Bank of statistics, articles, speeches, government agency studies, legislation, changes we can claim credit for (e.g., non-sexist textbooks), and so on. All AWM members contribute information when they find it. It was suggested that someone knowledgable in statistics act as Coordinator, and that perhaps AWM apply for a grant from NSF to collect and even generate more data.

Alice told us about the hearings on the Women in Science and Technology Equal Opportunity Act bill (S. 568). The bill, which NSF opposes, would set up an Advisory Committee, composed of women, to the National Science Foundation.

Lenore gave a valuable pep talk, urging us to be more assertive and visible both in our mathematics and our lives as women mathematicians. She said that she sees very little improvement in the future of women mathematicians unless we continue to push for ourselves and especially for young girls. She also shared many of her experiences with the programs of the Math/Science Network. Many women expressed interest in establishing such a network in the Boston area.

The approximately twenty-five AWM members present enjoyed a fine brunch which was prepared by Martha.

Respectfully submitted,
Martha Jaffe
Rhonda Hughes

THE ROLE OF PROFESSIONAL VISIBILITY IN A SCIENTIFIC CAREER

by Meera Blattner, National Science Foundation

When I was a mathematics student, first in the fifties, then later in the sixties, people would say to me, "If you were really interested in doing mathematics you wouldn't have to work for a degree; you could stay at home and prove your theorems. Your real motivation for working on a degree is to compete with your husband." Later in the sixties when I decided to work for my Ph.D. in computer science, I still heard that same refrain. Fortunately, one doesn't hear that sort of thing anymore. The fact that a woman may wish to be a scientist or a mathematician for no reason other than she finds such a discipline rewarding is unquestioned. Nor is it commonly thought that she is

going against her natural biological instincts by choosing a career in the sciences as was thought in the fifties.

Have we really come much further? In my own conversations with professional colleagues and as a faculty advisor to The Society of Women Engineers at Rice University, I still see a distinct difference in the images of the male and female scientist. How many women sit in isolated offices working on problems that are no longer in the mainstream of their discipline due to lack of scientific contacts? How many women are overworked in classrooms and available to students on an almost 24-hour basis because their departments encourage them to teach rather than do research? How many times have I heard from male colleagues, including one recently at the NSF, "Women don't like to do research."

Are women scientists as a group as successful as their male counterparts, even disregarding their small number? Academic success is to a large extent a self-fulfilling prophecy. Those from "better" universities with "better" advisors are selected for "better" positions. The "better" positions bring with them a nurturing environment: an atmosphere dedicated to good science, an availability of funds for travel to conferences, confidence from one's peers, and most of all, a stimulating research environment. We all know of those who did not have such a favored environment and still became successful. But there are even more "successes" that would not have made it without the nurturing environment. The proportion of women that have such a favored environment is low indeed in comparison to the proportion of men who have that environment.

What is success in research anyway? We all wish to be scientists who will leave a mark on the intellectual thought of the times through ideas that are deep and germinal. Let us consider the accomplishments of our most successful mathematicians and computer scientists. Taking our criteria of "success" from those in our areas who are the important figures of our times, let us look at the nature of their accomplishments:

1. A technical book or books, usually on the junior, senior or first-year graduate level.
2. A number of graduate students, usually placed in good positions after receiving their degrees.
3. Invited talks at major conferences, editorships of journals, prominent positions on program committees, panels and advisory committees.
4. Expertise in a number of areas, particularly the newer and more trendy areas.
5. Resumés which contain a long list of research papers.

The research papers, when carefully examined, fall into the class of "solid, workman-like papers dealing with technical questions." A large number of these papers may have been coauthored by graduate students or junior professors. But how many of our successful senior scientists have done foundation-building research? Very few, indeed.

The main characteristics of the successful researcher are hard work, enthusiasm, intellectual competence, a desire to spend long hours on research, a stylistic flair, an ability to communicate with professional colleagues, a sense of the important research trends, confidence, and, most of all, professional visibility. The successful are invited speakers, program committee chairmen, editors of prestigious journals and members of advisory panels. They all seem to have the right professional friends. It may seem at first sight that our more successful friends are reaping the just rewards of their intellectual accomplishments. However, professional visibility requires aggressive interaction between scientists and their coworkers.

A scientist must constantly "sell" himself or herself. By "selling," of course, I mean that scientists must make known their research results and convince others of the worth of their ideas. Of course, greatly exaggerated ideas as to one's own accomplishments rarely make a good impression on one's peers. But confidence in oneself and one's abilities is a necessity. The academic world, as well as the nonacademic world, revolves to a large degree around power and money. Money to a scientist means the ability to build a department, fund graduate students, travel to international meetings, obtain visiting appointments at prestigious universities and obtain the secretarial help required to maintain an active professional career.

Most women have not recognized the need for professional visibility in their careers. They are still worrying about whether they are sufficiently assertive when, as a matter of fact, they should be concerned as to whether they are sufficiently aggressive. Without professional visibility there is little recognition of one's accomplishments, and academic life can become introverted and unchallenging with the excitement of new and pertinent ideas passing one by because of lack of communication.

There are ways women can participate more fully in a professional life that lead to recognition and interaction with others:

1. Keep on top of what is going on in research in your area and related areas. Breadth of understanding is very important for those selected to be on committees and panels. Question peers as to what their current research interests are and demonstrate that you are well-informed. The nonassertive woman rarely engages in such conversations, and one can only assume she is uninformed.

2. Attend major conferences in your area of expertise or those areas you believe you should be expert in. If you don't have university money or grant money, go anyway. Try to meet as many people as possible at these conferences. Don't hang back because you haven't been formally introduced, and don't be disturbed over little put-downs. These are simply part of the game.

3. Submit papers to major conferences. The acceptance procedures vary radically from area to area and conference to conference. In the highly refereed conferences in computer science, it is usually quite difficult to get an acceptance. If your paper is not accepted, don't agonize. Just submit it to another conference (after reworking it a bit). Often papers are not accepted because the referees don't understand the point of the research. Chances are that your paper was refereed in ten to fifteen minutes by someone out of your area.

4. Try to give as many seminar talks as possible at other universities. Tell your friends you would like to give talks. This familiarizes others with your work and may create opportunities for joint research.

5. Get research grants. Try to obtain funds for graduate students (almost impossible in math).

6. Be an officer in a prestigious professional group or the editor of a journal. Of course, you won't be asked to assume such a position until you are already established. But this additional recognition will give you even greater visibility.

7. Organize conferences and workshops at your university. Invite top people to give talks.

8. Write papers with others that are well-known in your area, but don't waste time on uncooperative individuals.

9. Take leaves or sabbaticals to places that are active research centers. Make a point of interacting as much as possible while you are there.

I am not suggesting that items in the above list become a substitute for research but merely that the activities above, even though time consuming, may help create an environment conducive to research. There is no substitute for good research. Many truly great thinkers are quiet and retiring individuals whose work is not recognized for many years after it is done. At the other extreme, there are the "operators" that do very little, talk a lot, and eventually fade into oblivion. Neither of these extremes is a good model on which to base professional development.

In general, such an active interaction is difficult for those who are quiet and not assertive. A conference where you are not part of the in-group can be an ego-assaulting affair. You start to feel alternately ignored or put down. Most all of the activities suggested above require constant coping with rejection and constant reminders of the current pecking order. In order to cope: remember it is all a game, so don't get emotionally involved. Your real potential won't be measured by little interplays. Those who are quickest with the put-downs are usually the most shallow.

Grants are a necessity for professional visibility. Women are not applying for grants in the proportions one would expect. If you are seriously engaged in research, you should apply for a grant. Do more than that; find out how the funding agencies work.

Find out what programs are being funded and who is the program director. Talk to people who are being funded and find out what they know about writing proposals. Don't be afraid of getting declined, since it doesn't affect future funding. It is my own personal opinion that the peer review system we have here at the NSF works against women mathematicians and scientists. They have the same problems with peer review that they have in any academic situation. There is less confidence in a woman's ability to do research than in a man's. I'm not talking about a few women superstars but the better-than-average, competent woman. Professional visibility helps you get a grant because the reviewers have more confidence in those they have met and heard speak. If the NSF declines your proposal, ask immediately to see your reviews. If you believe your reviews were unfair, subjective or otherwise unprofessional, you may wish to ask for a reconsideration. The reconsideration process is a formal one described in Grants for Scientific Research. The reconsideration process, as it is currently handled, rarely reverses a program director's decision. However, the reconsideration process focuses attention on the nature of the decision that was made in the evaluation of a proposal. The AWM will keep a file of reviews believed to be sex-biased. If you believe your reviews were biased, send a copy of your proposal, the reviews, and any other correspondence between yourself and the NSF to Professor Mary Gray, American University, Washington, DC 20016.

It is a little-known fact that if the reconsideration does not return a decision in your favor then a reconsideration on a higher level may be requested, this time by your university. This possibility has not been sufficiently explored by those who are considered talented by their peers and still seem to be unable to obtain grants. If you were declined but the reviews seemed reasonable, write a new proposal and submit it. Try to be realistic in evaluating your reviews. The NSF program directors handle between one hundred and five hundred proposals a year. If a substantial number of people engaged in some sort of rebuttal with regard to their reviews each year, the system would be hopelessly clogged up and new staff would have to be hired. The program directors generally look for unprofessional bias in reviews, but with the large work load they are given subtleties can rarely be detected.

It becomes harder to combat what appears to be prejudice in our review system if the number of women submitting proposals is very small. The women that actually apply for grants are extremely well-qualified and probably a very substantial number of those proposals should be funded. Even comparing the number of proposals recommended to those declined we cannot see the great disparity in the proportion of male and female scientists funded in the mathematical sciences and engineering. In the Applied Mathematics Program this year the ratio of men to women submitting proposals was fifty to one.

To give greater visibility to women scientists and to give greater weight to their opinions women should be well-represented on panels and advisory committees and as reviewers. This year I had difficulty in getting some women to review proposals. Since we send each proposal to six or seven reviewers for evaluation, every principal investigator submitting a proposal should be willing to evaluate six or seven proposals, if necessary. It is particularly important for the small number of women applying for grants to undertake this responsibility. Since industry hires a substantial number of professional women, it is important for women in industry to serve on panels and as reviewers. An improvement in the status of women in general will help women in industry as well.

If you are a well-established professional woman, be a friend and advisor to other women scientists. The advances women have made in the past ten or fifteen years have been through the efforts of those who have worked hard to see the Woman's Movement succeed. I have little patience with women who claim they made it entirely on their own. All those that have had some professional stature have had the confidence of those that were in a position to help them. If you know women who are just getting started in their professional careers, help them get sound advice about what they should do to create professional visibility. Advise them as to what will benefit them and what will simply absorb time. Tune them into departmental politics and the problems that may occur. Most of all, encourage them to work hard and write good research papers.

LISE MEITNER: THE MATHEMATICAL INTERPRETATION OF NUCLEAR FISSION

part two of a two-part series exploring the life and times of the Austrian-born woman physicist

by Pat Rife, currently a doctoral student in the Union Graduate School. Her field is Social Thought, and she is writing a biography of Lise Meitner, analyzing the cultural influences of her development as a woman scientist. Pat plans to take classes at Harvard and the Univ. of Pennsylvania in the History and Sociology of Science and Mathematics.

Mathematics flowered in the Germany and Austria of the 1920's era. Notables such as Minkowski, Hilbert, and Born taught at the famed University of Göttingen, with whom Werner Heisenberg, Wolfgang Pauli, and many other theoretical and experimental physicists of later years were to study. They were later to press "across the frontiers" of mathematical formalism and philosophic certainty in physics.[1]

In the University of Berlin, Max Planck, Max von Laue and others struggled with the complexities of quantum theory; Einstein's Theories of Relativity were still the talk of the day. The close bonds of mathematical symbolization and interpretation of physical processes - that "natural language of science" on which Plato elaborated in his classic, Timaeus - were heightened as mathematicians and physicists struggled with the complexities of the newly-developed quantum mechanics. During the same time period, roughly between 1921-30, amazing results were emerging from laboratories around the world concerning the processes of the minute atom and its core, the nucleus.

Lise Meitner and Otto Hahn

In the early 1930's, Lise Meitner, research physicist, Professor Extrodinare at the University of Berlin, lecturer, head of the Radio-Physics Department at the Kaiser Wilhelm Institute of Chemistry in Berlin-Dahlem since 1914, was working towards clarifying the relationship between beta and gamma rays given off in nuclear disintegration.[2] Over and above her debates within weekly physics colloquia in Berlin, where her now-colleagues Nerst, Planck, and Haber, Director of Kaiser Wilhelm Institute of Physical Chemistry (as well as peers Einstein, Geiger, Franck and von Laue) engaged in lively discussions on the latest physical and mathematical developments, Meitner was still deeply involved in experimental work. In 1934, a previous ten-year collaboration with the radio-chemist Otto Hahn became a working relationship once again as they pressed toward new results on the baffling questions of the nucleus. Meitner, with her superb mathematical background in nuclear theory and radiochemistry, and Hahn (who through applied radiochemistry had found the first results of isomerism in the 1920's) were at that time extremely interested in reports coming from Italy. New results and mathematical interpretations, the scientific journals read, had been obtained by physicist Enrico Fermi, who had been engaged in research bombarding heavy elements with neutrons. The impetus for Meitner and Hahn's joint research was further sparked when Hahn, investigating the charged particles left behind in "alpha-emitting" substances, discovered several "decay products" for the element uranium. Meitner and Hahn presumed these products to be "trans-uranic" elements, with atomic numbers greater than 92.[3] Little did they realize that their "transuranics" were to lead them toward one of the greatest discoveries of the twentieth century.

As one of the very few women in her profession on the Continent, Meitner was equally at home in the city of Berlin, where she had come in 1907 (later to become Max Planck's

assistant at the age of 34), or in travels to give lectures on her joint research with alpha particle and beta ray emission. She was a frequent guest of the great physicist Niels Bohr at his Institute for Theoretical Physics in Copenhagen. Here the latest complexities regarding the Uncertainty Principle (Heisenberg, 1927), the deBroglie-Schrödinger picture of the electron, and the more advanced, purely mathematical explanation of the atom, called "matrix mechanics" - which used spectral lines as a starting point for calculations, but soon abandoned discrete pictorial representation for a set of numbers[4] - were discussed with some of the finest young minds in physics. Meitner was also an enthusiastic Alpine hiker, returning often to her Viennese family home to hike with friends. Her love for classical music and the serenity of chamber music also endeared her to the cultural circle which developed between many scientists and their families in Berlin.[5]

Lise Meitner
and
Otto Hahn

Yet the calm intensity of her work in physics was not to endure through the decade of the 1930's. As the Nazi Party rose to power, anti-Semitism spread throughout even the quiet confines of academia. Although her Austrian citizenship protected her from the early purges within the German universities and governmental offices, many others did not fare as well. In 1933, the Reichcommisar in the Prussian Ministry of Education initiated disciplinary action against Albert Einstein, then lecturing in the U.S. His Theory of Relativity, which had brought such acclaim to German science, was denounced as "Jewish propaganda". The scientific community was shocked.

Historically, it was not until a decree was issued by the Prussian Minister of Science, Arts and Education as late as 1920 that women had even obtained the right to qualify for a professorship (Habilitation) in Germany, in reply to a petition of the philosopher and disciple of Edmund Husserl, Edith Stein (Breslau, 1891 - Auschwitz, 1942).[6] Most lost this tenuous right through the so-called "Arier-paragraph 3"--dismissal of civil servants of non-Aryan descent--or paragraph 4--dismissal for politic reason--of the "Gesetz zur Wiederherstellung des Berufsbeamtentums" ("Law for the Reestablishment of the Professional Civil Service")[7] as early as 1933. Thus the well-known losses to German science from 1933 to 1939 resulting from racial and political persecution by the Nazi regime, or by voluntary emigration,[8] affected women to a much greater extent and meant a great setback to the academic feminist movement in Germany.[9]

Yet Einstein and other prominent Jewish citizens, both male and female, were not the only scientists to feel the foreboding winds of the growing Nazi Reich. The Kaiser

Wilhelm Institute in which Meitner worked and lectured had been formed early in the century as a research center stressing scientific independence and freedom, as well as the cooperation of industry, science, and government.[10] In 1912, Meitner's partner Hahn became Head of the Department of the Chemistry of Radioactive compounds; Meitner, of the section for the atomic physics of these compounds in 1913. In the adjoining Department of Physical Chemistry, the brilliant Fritz Haber, who became Director and organizer of this section of the Institute in 1912, had been conducting research demonstrating by spectrophotometry a number of very quickly disappearing intermediary radicals leading eventually to the end product. These observations later led to work on biological oxidation.[11] The Kaiser Wilhelm Institute's international reputation and student body had made it one of the world's leading scientific centers. Yet when Haber died of a heart attack on a trip to Israel in late 1934, even his international scientific reputation and numerous contributions to German industry and military did not stop the Reich Ministry from prohibiting many scientists from attending the large memorial service. But Meitner and Hahn, who was to read a manuscript for a conspicuously absent member, were clearly present. "Most of the participants were women," Hahn recalled;[12] "wives of professors of Berlin, of the Kaiser Wilhelm Society, and of Fritz Haber's friends. They came as representatives of husbands who were deprived by a brutal prohibition of their possibility to say a last farewell to an important man and scientist." "In early 1935," he continues, "this obvious resistance to the regime was still possible." The final instructions of the Ministry were that no reports of the event and no publications of the lectures given were to be distributed. "This is an example," Hahn reflected, "of how a science which has nothing to do with Weltanschauung may hit upon difficult situations when political ideologies exceed their limits."[13]

Otto Hahn

Hahn and Meitner continued their research when possible, with their young assistant Fritz Strassman's skill at chemical analysis close at hand, and their own expertise in experimental work supporting the puzzling findings emerging from their laboratory. Ida Noddack, a German woman chemist, had raised questions in the academic world against Fermi's assumptions concerning "transuranic" elements, implying that the uranium bombarded with neutrons did not decay as he proposed. The French team of Irene and Frederick Joliot-Curie (daughter and son-in-law of the famed Madame Curie) had also been hard at work during the early 1930's experimenting with irradiating uranium and other elements with neutrons, and found a penetrating source of beta rays which chemically behaved somewhat like thorium.[14] In fact, the analytic experimentalist Strassman (who later identified Meitner as the intellectual leader of the team, a fact Hahn fails to mention in many later remembrances) came up with the element barium on analyzing uranium irradiated with thermal neutrons one night in 1936, but Meitner's skeptical remarks that this contradicted the theories of physics led him to throw away his results.[15]

Meanwhile, the political situation intensified in Germany. With the annexation of Austria in 1938, Meitner was robbed of her protection as a foreign national from Austria. "She had never concealed her Jewish origin," states her nephew Otto Frisch, then studying physics at Niels Bohr's institute in Copenhagen; "her Austrian passport became invalid, and her dismissal from the institute certain."[16] The Dutch physicist Peter Debye communicated this news to Dirk Coster, then at the University of Groningen in Holland.

Arrangements were made; and no one except Hahn knew that she was not leaving Germany on "holiday", but for good. Lise Meitner was then sixty years old.

Meitner soon chose to accept an invitation from Manne Siegbahn to work in the new Nobel Institute in Stockholm, Sweden, where a cyclotron was being constructed. Worried about her friends and colleagues, and concerned over Hahn's statement that neutron bombardment of uranium leads to "isotopes of radium", she wrote her long-term research partner asking for irrefutable data concerning the properties of these substances. Her request led to further experimentation by Hahn and Fritz Strassman, and they wrote to inform her that such "substances" could be precipitated with barium but, surprisingly, were inseparable from it.[17] In the joint paper by Strassman and Hahn submitted to Naturwissenschaften, Dec. 22, 1938 (Strassman later remembered that all the papers published "jointly" with him were written by Hahn, and that he himself never had a chance to look them over),[18] their findings were stated and the following proposed:

> "As nuclear chemists closely connected with physics in a certain way we cannot yet make up our mind to undertake that leap, which contradicts all previous experience of nuclear physics. [Meitner's influence.] A number of strange coincidences might have feigned our results."[19]

So, by default, direct participation in the unequivocal identification of a first product of transformation of uranium nuclei bombarded with thermal neutrons, and thus the claim to being a "co-discoverer" along with Hahn and Strassman, was denied Lise Meitner.

When this news reached grim Sweden, Otto Frisch was visiting his aunt over the holidays. They decided to take a walk in the snowy woods nearby to discuss the matter. "It soon became clear," Frisch recalls, "that Bohr's 'droplet model' of the nucleus must provide a clue to understanding how barium nuclei were formed from uranium nuclei", barium being halfway down the periodic table of elements. Frisch suggested that a "division", like a water droplet splitting, was made possible through the mutual repulsion of the many protons of the uranium nucleus.[20] They sat down on an old log, and Meitner began estimating the difference between the mass of the uranium nucleus (plus the extra neutron with which it had been bombarded) and the slightly smaller total mass of the two fragment nuclei. Through Einstein's mass-energy equivalence, she mathematically calculated the large amount of energy that was bound to be released. "The two mutually repulsed fragments would, indeed, be driven apart," Frisch remembers, "with an energy that agreed with her value - so it all fitted."[21]

Lise Meitner

Meitner and Frisch published their findings in the famous Feb. 11, 1939 issue of Nature in an article entitled "Disintegration of Uranium by Neutrons: A New Type of Nuclear Reaction." But it was only a short week after their insight in Dec. 1938 that Frisch, returning to Copenhagen before Niels Bohr was to set sail for America to attend an international conference on physics, told Bohr about his findings. Bohr struck his forehead with the news; of course, they all should have seen this earlier.[22] On board ship, he reconfirmed Meitner's mathematical findings, and although he had promised to wait until their insight had been published, the news came out at the meeting of the American Physical Society in Washington, D.C. Physicists rushed to the phone to alert their research staff to the findings; within a week, five university research teams in America had confirmed the results of the process of nuclear fission. The rest is history.

It is interesting to speculate on the results of WWII without the production of an atom bomb; the fact that so many Jewish scientists were driven from Nazi Germany, only to end up in a desert called Los Alamos, New Mexico, where their international talents were utilized to the fullest. In 1945, after the war, Lise Meitner served as an Honorary Professor for six months at the Catholic University in Washington, D.C.,[23] and was able to lecture at the major East Coast universities, as well as visit with women colleagues who had also escaped the fate of Nazi Germany. Her partner Hahn had been taken prisoner of war in 1945, and heard the news of the destruction of Hiroshima and Nagasaki over the guard's radio in an English cottage where they had been detained.[24] He was deeply shocked and distressed; there is little on record of Meitner's reaction. Questions such as discovery rights, the justice served when Hahn was awarded the 1944 Nobel Prize (Dec. 10, 1946)[25] and other issues are still being debated. Meitner spent the rest of her life in Sweden, lecturing and conducting research in physics, and occasionally speaking on the issue of the status of women in the profession.[26] After the war, she took pains to dissociate her work with the atom bomb. In an interview shortly after the war drew to a close, she stated, "I must stress that I myself have not in any way worked on the smashing of the atom with the idea of producing death-dealing weapons. You must not blame us scientists for the use to which war technicians have put our discoveries."[27] Yet she remained optimistic. "I can say that in Sweden, too, physics has brought light and fullness to my life. What still gives ground for anxiety of course is what mankind will make of this newly won knowledge, which might come to be used for destruction on a tremendous scale."[28] The mathematician, the theorist, the experimentalist, the radio-physicist Lise Meitner, however, pursued her love for her field until her death in England in 1967 - and lives on in the history of those who, through their insight and dedication, have altered the course of our twentieth century world.

Otto Hahn, Werner Heisenberg, Lise Meitner, and Max Born

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Footnote 21 from part one: same as footnote 20, part one.

BUNTING FELLOWS ANNOUNCED

Two mathematicians were recently appointed as Fellows at the Mary Ingraham Bunting Institute of Radcliffe College for 1980-81. Linda A. Ness of the University of Washington will conduct research in algebraic and differential geometry; Susan Carol Geller of Purdue University will pursue the project "Studies in Algebraic K-Theory."

The Bunting Institute is the only research center in the country primarily for women scholars and artists; it is one of the four largest centers in the country awarding postdoctoral fellowships.

CLIMBING THE ACADEMIC LADDER: DOCTORAL WOMEN SCIENTISTS IN ACADEME: part four

a report to the Office of Science and Technology Policy from the Committee on the Education and Employment of Women in Science and Engineering Commission on Human Resources, National Research Council, National Academy of Sciences, Washington, DC, 1979
Tables too numerous to duplicate have been omitted.

POSTDOCTORAL TRAINING (Chapter 3)

Once limited to a few young scientists of exceptional promise, postdoctoral training has increased dramatically in both the natural and social sciences over the past twenty years (NRC, 1974, p. 30), although the rates of increase vary substantially by discipline. Several observers have noted that the increasing popularity of postdoctoral appointments is inversely related to the availability of regular positions, especially tenure-track faculty posts (Cartter, 1971; NRC, 1969; NRC, 1971; Wilsnack, 1977). Conversely, the availability of postdoctoral positions varies considerably with the amount of research support available in a given field or year.

Because research support comes very largely from Federal sources, and because noncompliance with equal opportunity policies threatens withdrawal of such support, science departments which are potentially most vulnerable to such a loss should furnish good test cases for examining recent sex patterns. For that reason, we examine several factors in postdoctoral training (and in faculty employment in Chapter 4) by grouping institutions according to Federal R&D expenditures.

The traditional benefits of postdoctoral study include freedom to do research without the pressures inherent in either graduate study or a first job, the expansion of research horizons, an opportunity to establish or expand publication records, and the broadening of professional contacts and personal exposure. A consequence of these benefits for postdoctoral fellows is the increased likelihood of holding tenure-track faculty posts at research universities (Folger et al., 1970, p. 249; NRC, 1974, p. 65-69). But such consequences may not follow equally for men and women, and a more detailed examination of what happens to women as postdoctorals is therefore important. Some older studies may serve as background to consideration of these issues.

The largest of these, The Invisible University (NRC, 1969) treated women scientists themselves as almost invisible, reporting briefly that they received substantially lower stipends than men, remained long-term postdoctorals about three times as often, could not expect to hold regular faculty appointments, and were therefore happy to hold any kind of postdoctoral position (pp. 70, 105, 117-118, 135, 226). All inequities were uniformly ascribed to family constraints, although nearly half the female population in the study was unmarried.

Although women constituted one-tenth of the postdoctoral population under study (computed from NRC, 1969, Table 27, p. 105), the report did not consider how the post-doctoral experience affected them, whether it was significantly different from that of men, or even whether the money spent on them was well invested. The data upon which the report was based were coded by sex, marital status, and number of dependents, but not analyzed to ascertain the differential effects of these variables on stipends or career opportunities. The report is therefore of very limited usefulness for our purposes.

Reanalysis of this body of data to establish relationships between sex and marital status, type of postdoctoral appointment, stipends, length of time in postdoctoral training, and subsequent positions held would furnish an important bench mark for comparison with future studies. We strongly urge that such a reanalysis be undertaken.

The second major study of postdoctoral training (NRC, 1974) again collected data by sex (and certain performance measures were standardized by sex; pp. 118-119), but analyses in the body of the report were not broken down by sex, and this report added little to our knowledge of the experience of female postdoctorals.

There is some evidence that female scientists were more likely than males to have postdoctoral training (NRC, 1968, p. 81; Reskin, 1976, p. 607), but more complex data for more disciplines are necessary to permit generalizations about sex differences.

The importance of postdoctoral training for the individual lies in the direct enhancement of careers, and the only major study of this effect which has been undertaken, for the field of chemistry, (Reskin, 1973 and 1976) gave very different results for men and women. Although the women were more likely to have had postdoctoral fellowships than the men, the male fellows received substantially more prestigious awards. Such indicators of predoctoral quality as caliber of undergraduate institution, prestige of doctoral department, elapsed time from baccalaureate, or productivity of Ph.D. sponsor were found to be significantly related to prestige of the postdoctoral award for men, but unrelated for women. In particular, selectivity of the B.A. institution and predoctoral publications increased award prestige greatly for men but not for women.

Careers of sample members were traced for 10-15 years after the Ph.D (through 1970). The results showed that the receipt of a postdoctoral award and its prestige facilitated the male chemists' careers in the expected manner (e.g., increased their likelihood of holding a tenured university appointment), but had no effect on the women's occupational outcome. This finding is especially significant in view of the fact that the subsequent scientific productivity (measured by both number of articles and citations) of both sexes was enhanced by postdoctoral training. Thus women, like men, profited from their postdoctoral training, but unlike men they could not convert their subsequent superior performance to permanent jobs as university faculty. In a larger study of the same chemists (Reskin, 1973) it was found that women's productivity over their first ten years after receiving the Ph.D. was generally unrelated to the positions they held at that time although men's performance and occupational position were positively related.

These results concerning an earlier period are cited here primarily to underline the traditional importance of postdoctoral training for men and illustrate the fact that at least in the past women were unlikely to realize the same benefits. We do not yet have a sufficiently long perspective on recent postdoctorals to know whether these inequities persist, or to what extent. An understanding of the ways in which women's careers differed in detail from men's in the past, even with an equal or better start, can serve to highlight the factors which need to be monitored in the future in relation to the outcomes of postdoctoral training.

The presence of postdoctoral fellows or research associates also has important benefits for the research groups they join, increasing the group's overall research output and adding new or different capabilities. These benefits accrue most markedly to the group's mentor, and ideally a symbiotic relationship exists between the mentor and postdoctoral fellow (NRC, 1969). Based on Reskin's study dealing with chemistry, women postdoctorals may not have been viewed in the past as promising disciples because of their much lower likelihood of obtaining positions which would permit them to carry on independent research careers (Reskin, 1976; see also Chapter 4) or to achieve other kinds of professional recognition (Chapter 5). This perception may in turn lessen the help and attention they receive from their postdoctoral mentors. New studies, such as the one in progress by the Committee on the Study of Postdoctorals and Doctoral Research Staff of the Commission on Human Resources, should endeavor to assess these rather subtle issues.

The Current Patterns of Postdoctoral Appointments

At the present time, similar proportions of men and women doctorates plan postdoctoral study though there is considerable variation by field. A table shows the percentages of 1977 Ph.D.'s in each field planning such training, as well as percentages of those with definite appointments and those still seeking or negotiating contracts. If we examine similar data for several years we find predictable fluctuations in those fields where women are very poorly represented, and where those interested in postdoctoral work may comprise only a few individuals.

It is clear that in general, high proportions of doctorates in the biological and physical sciences, excluding mathematics, take such positions. Earth sciences displays somewhat lower proportions than the other physical sciences while engineering shows still lower percentages. Mathematics is in sharp contrast to the other EMP fields in that there are few postdoctoral positions. In psychology, the percentage is relatively low and the social sciences reflect still smaller figures. It is apparent that the requirements of

each field that encourage work at this level and the opportunities for postdoctoral study vary widely.

A tabulation by sex and marital status of the 1970-1977 degree recipients who were planning postdoctoral study at the time they received their degrees sheds further light on factors associated with postdoctoral study. As indicated earlier (Chapter 2), married men are the group least likely to plan such appointments. This holds true for doctorates as a whole and in each field except mathematics. The NRC survey of biomedical and behavioral scientists found a similar pattern among 1971-1975 degree holders in these fields: lower proportions of married men held such appointments at any time after the degree or at the time of the study (1976). The married men in both fields who had held such appointments were far more likely than single men or women, and somewhat more likely than married women, to give as a reason for having undertaken postdoctoral work the inability to find a job, as opposed to the goal of obtaining research experience or switching fields (NRC, 1977, Vol. 2, pp. 133-135). The comparison of postdoctoral stipends with the salaries offered in the various employment sectors, in relation to the assumed financial responsibilities of married men makes this finding understandable. Thus the lower incidence of postdoctorals among married men is probably due to societal pressures on this group for greater earnings.

In contrast, on the whole and in nearly every field, single men are most likely to plan postdoctoral work. Why they should make this choice more frequently than single or married women is not obvious. Nor, without a closer examination of each field, can the exceptions be explained: the higher proportions of single women in physics and earth sciences and of married women in agricultural sciences.

A table illustrates recent trends in the sex composition of the postdoctoral population as well as the changes that have occurred at institutions of different rank in the sciences as a whole and in two fields. Except for a very slight decline among the top 25 institutions in 1977, there is a steady rise in the proportion of women at the postdoctoral level. Similar results are found for the individual fields of chemistry and biosciences which consistently have postdoctoral populations that are large enough to be examined in this way.

The table also shows that in the biosciences, the proportions of women postdoctorals have been and continue to be larger at the lowest-ranked institutions, but this has not been the case in chemistry. The greater concentration of women in "all other" institutions throughout the 1973-1977 period is largely accounted for by women in the biosciences who make up the majority of all women postdoctoral appointees. The percentage increase of women in the biological sciences during this period has, however, been smaller at low-ranking institutions than among the top 25.

A table illustrates the changes in the proportions of women at the postdoctoral level in a different way by showing the percentages by fields of the members of each sex employed in academic institutions who were in postdoctoral positions in 1973 and 1977. Proportions of women increased in all fields except medical sciences. In several fields with very few women--physics/astronomy, earth sciences, engineering, and agricultural sciences--the percentages of women increased markedly over the four-year period so that there was a substantial difference between the sexes in 1977, but it should be noted that the numbers are very small. A similar pattern was observed in the social sciences, a field in which there are very few postdoctorals of either sex. In chemistry and biology, the fields with the largest numbers of postdoctorals, the proportions of women were larger than those of men in 1973 and the difference increased in 1977.

The acceptances of men and women applying for postdoctorals are illustrated in a table. Shown are the total number of new Ph.D.'s who desired postdoctoral appointments (i.e., fellowships, traineeships, research associateships, etc.) and the percentage of those who had signed contracts or awards at the time of Ph.D. It should be noted that in some fields there are wide year-to-year fluctuations due to small numbers.

In chemistry and biological sciences--the fields with the largest numbers of postdoctorals--rates of awards to women over the past decade have been consistently lower than for men, although the differences are not large.

Physics shows no improvement in relative awards to women since the advent of affirmative action, and this pattern coincides with what is perhaps the weakest employment prospect of all science fields. However, in the medical sciences, the comparative figures favor women in 1977.

Holding Status

An issue that has long been posed with respect to women postdoctorals is whether, in fact, they remain in these appointments in a kind of "holding status" because they cannot find any other employment or because they are prevented by marital ties from moving elsewhere to look for jobs. This was the assumption clearly stated in The Invisible University (NRC, 1969, pp. 70, 118). In the only detailed analysis of sex differences in postdoctoral experience, Reskin's study of 1955-1961 Ph.D.'s in chemistry found that women, and particularly married women, were indeed more likely than men to have held multiple appointments and to have held these longer (1976, pp. 608-609). The recent NRC survey of 1971-1975 biomedical and behavioral science Ph.D.'s, however, did not find this pattern. Although breakdowns of the data were not made by marital status or other factors, men in the behavioral sciences were much more likely, and in the biomedical fields somewhat more likely, than women to have had their postdoctoral appointments prolonged or to have held them for more than 36 months (NRC, 1977, Vol. 2, pp. 31, 78). Again, we need an updated and detailed analysis by field of the experiences of men and women at the postdoctoral level.

Postdoctoral Stipends

Stipends are an important measure of equity for several reasons. Inequities at this level may contribute to disadvantages in subsequent salaries. Further, systematic inequities are harder to uncover here than in readily visible criteria such as rank because salary information frequently remains private.

Postdoctoral stipends are also subject to the normal economics of supply and demand, and to the exigencies of research support, so that they may vary quite significantly from year to year, field to field, or even project to project. When groups of reasonable size within a particular field are compared, however, their salaries would not be expected to differ significantly in the absence of group biases.

Such comparisons are not easy to generate for postdoctoral fellows, and information from previous studies is not abundant. About a decade ago, women postdoctorals were reported to earn an average of about $1400 less than men. The large differential has narrowed since then, but now appears to be rising again as the academic job situation deteriorates.

Postdoctoral stipends for biomedical and behavioral scientists reported for 1976 (NRC, 1977, 2:131-2) showed considerable variation between the two areas; male postdoctorals in biomedical sciences earned 3.6 percent more than women, but for behavioral scientists the men's earnings exceeded the women's by 11.8 percent. For postdoctorals under age 30, the differences were 1 percent and 6.5 percent for biomedical and behavioral scientists, respectively, but for those aged 30-39, men's earnings exceeded women's by 4.6 and 11.8 percent. When the data were controlled by marital status and sex, married men were found to have the highest stipends.

Efforts to desegregate the salary data for postdoctorals by field, Ph.D. cohort, and type of institution are not very informative because the various categories contain too few women to yield meaningful information.

Conclusions and Recommendations

A postdoctoral appointment is an important career stage intended as a springboard, but it is not clear that it yields the same results for women as for men. The responsibility for achieving maximal benefits from postdoctoral appointments rests individually with postdoctoral sponsors and collectively with science departments, and must be shared by women scientists themselves in a heightened awareness that decisions made at this career stage may have very far-reaching consequences.

Postdoctoral awards represent a gray area in equal opportunity, not explicitly addressed by the statutes referring to either education or employment. Depending on individual institutional practice, a postdoctoral may have student or staff status, or no defined status at all. For affirmative action monitoring, the position may therefore not be subject to reporting, or may fall in one of several possible categories, faculty among them. From the point of view of compliance (in addition to others, such as fair employment practices) clarification of postdoctoral status is needed.

Dependent as most postdoctoral awards are on federal research support, they comprise a category of employment which should be subject to more careful assessment of equality of opportunity. Research awards which support postdoctorals should ideally be contingent in part on effective provision of equal opportunity and demonstrable absence of biased procedures. Nonetheless, we hesitate to recommend a blanket policy of compliance monitoring of postdoctoral positions, mindful of the fact that agency program staffs are unlikely to be good compliance officers, and vice versa. As a beginning, however, major granting agencies, including especially NSF and NIH, should develop standards for effectively evaluating the bias-free distribution of postdoctoral appointments and methods for applying such standards to the award process. In order to provide a sound basis for such standards, the relationships between merit, nature, quality and number of awards, and sex, of the sort suggested in this report, need to be developed in greater detail. Investigators applying for postdoctoral funding could then evaluate their own progress, and would submit appropriate reports with their applications for support.

Such a procedure would have the advantage that responsibility and authority would rest with both individual departments and the specific persons most likely to be directly affected. By contrast, current regulations leave at least as great a paperwork burden on departments but ultimately spread the blame--and, if one were imposed, the penalty--over entire institutions.

On the basis of available data, it appears likely that at least a large part of the salary differences between men and women postdoctorals derives from bias. At this level no significant differences in overall ability or promise can be documented (see Chapter 2), and male and female scientists should be rewarded equally for comparable work. Systematic salary differences at this early career stage are important not only for their immediate relevance to equity but also as a portent of future status.

The case of sex differences in postdoctoral stipends presents difficult policy questions, however. In our judgment, individual stipends are apt to be determined more often by what the research budget will bear than by a prior decision to offer lower salaries to women as a group. Women who do not consider themselves primary wage earners or who lack alternatives may accept low offers more readily than men. Some of the differential we see in the data may be due to dependents' allowances provided in many kinds of fellowships; past experience suggests that women may not claim such allowances if they have employed husbands, or may not be granted them in such cases. We urge that the Commission on Human Resources study of postdoctoral staff currently in progress particularly address the details of these salary differentials. We believe salaries to be important indicators of possible discrimination as well as potential success. A detailed analysis, however, is outside the scope of the present study.

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ICME

At the last ICME in Karlsruhe, a number of women formed the International Organization of Women in Mathematics Education. An executive committee of 7 women from Germany, England, Sweden, Hungary, Australia, the United States, and France was chosen. The major concern of IOWME was that so few women were speakers or organizers at Karlsruhe. The impact of the organization on this year's ICME at Berkeley is clear: over 100 women are participants - 88 as speakers and 12 or more as presiders. One of the four plenary session speakers is Hermine Sinclair.

The following ICME events are of special interest to AWM members who attend the conference:

Monday, August 11, 10:10 - 11 - organizational meeting of the working group on increasing participation of women in mathematics - Dora Skypek, coordinator

Tuesday, August 12, 4:10 - 5 - "Contributions by Women to Mathematics Education"- Kristina Leeb - Lundberg, USA

Tuesday, August 12, evening - reception sponsored by Math/Science Network

Thursday, August 14 - 8:40 - 9:30 and 10:10 - 11 - panel "Status of Women and Girls in Mathematics: Progress and Problems" - panelists: Marjorie Carss, Australia; Nancy Shelley, Australia; Eileen Poiani, USA; Dora Helen Skypek, USA

Thursday, August 14, 11:10 - 12:40 - panel "Community Action Models to Increase the Participation of Girls and Women in Mathematics", sponsored by Math/Science Network - panelists: Lenore Blum, Kay Gilliland, Joann Koltnow, Nancy Kreinberg; reactor: Elizabeth Fennema

Friday, August 15, 2:10 - 5 - working group session "Women in Mathematics: A cross-cultural Comparison of Status and Problems" - 6 brief reports from representatives of several nations followed by open discussion

Saturday, August 16 - 8:40 - 9:30 and 10:10 - 11 - panel "Special Problems of Women in Mathematics" - panelists: Patricia Casserly, USA; Erika Schilzkant - Küdiger, Federal Republic of Germany; Brigitte Senechal, France; Sheila Tobias, USA; Paulin Yalo, Benin.

OF POSSIBLE INTEREST

Wadsworth, Inc. is starting a new series of upper division and graduate level textbooks and research monographs, to be called Wadsworth International Mathematics Series and Wadsworth International Statistics Series. Authors who wish to have their manuscripts considered for publication in either of these series should send a description of their project and vita to the Editor, Wadsworth International Group, 10 Davis Drive, Belmont, CA 94002.

The Center of Women Studies has started a source and reference library for the advancement of Women's Studies in Italy. Their finances are extremely limited. They would like all women that have written or done research on women to send them a free copy of the articles and/or books written, as well as any useful suggestions. Send to Centro Studi, donnawomanfemme, 00185 Roma - viale Angelico, 301, Italy.

Eden Press, Women's Publications, P.O. Box 51, St. Albans, VT 05478

Women Scientists in Industry and Government: How Much Progress in the 1970's, a report to the Office of Science and Technology Policy, prepared by a committee of the Commission on Human Resources, $5.00, National Academy of Sciences, Office of Publications, 2101 Constitution Avenue, N.W., Washington, DC 20418. Contents: Part 1 - Doctoral Women Scientists and Engineers in Industry - Supply of Women PhD's/Employment Trends/Utilization by Field/Profile by Industry/Women Managers/Salaries/Educational Background/Financial Support During Graduate School/Quality of Men and Women PhD's/ Postdoctoral Training/Industry Hiring/Summary and Discussion -- Part 2 - Women Scientists and Engineers in the Federal Government - Utilization by Field/Grade Distribution/Senior-Level Positions/Promotions between 1974 and 1978/Salary Increases/Women in Management/ New Hires/Summary and Discussion -- Conclusions and Recommendations.

DEADLINES: July 24 for Sept.-Oct., Sept. 24 for Nov.-Dec., Nov. 24 for Jan.-Feb.

ADDRESSES: Send all newsletter material except ads to Anne Leggett, Math Dept., Western Illinois University, Macomb, IL 61455. Send everything else, including ads, to AWM, Women's Research Center, Room 204, Wellesley College, 828 Washington St., Wellesley, MA 02181.

JOB ADS

Institutional members of AWM receive two free ads per year. All other ads are $10.00 apiece and must be prepaid. The vacancies listed below appear in alphabetical order by state. All institutions advertising below are Affirmative Action/Equal Opportunity employers.

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