File

Association for Women in Mathematics

Volume 9, Number 4 NEWSLETTER July-August 1979

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PRESIDENT'S REPORT

Duluth meeting. The 1979 AWM summer meeting will be held at the joint mathematics meetings at the University of Minnesota in Duluth. All of our scheduled events will be on Thursday, August 23. They are:

a panel discussion at 4 p.m. in Bohannon 90 on "Math education: a feminist perspective."

Moderator: Judy Roitman, University of Kansas
Panelists: Lenore Blum, Mills College
Deborah Hughes Hallett, Harvard University
Diane Resek, San Francisco State University

We also hope to have materials to present from a re-entry program in the De Anza Community College District (California).

a business meeting at 5 p.m. in Bohannon 90 (following the panel).

Agenda: new by-laws
Goal: to get a members' consensus on new by-laws to be voted on in the fall by mail ballot.

a wine and cheese party at 8 p.m. in the lounge of the Kirby Student Center.

There will also be an AWM table staffed throughout the meeting. Volunteers are needed to staff it - check with us when you come to the meetings. Come on by and visit; bring your friends too.

Also in Duluth: the MAA's Hedrick Lectures will be presented by Mary Ellen Rudin of the University of Wisconsin, Madison.

By-laws. The by-laws will be written up by mid-July, and available from the AWM office. Suggestions and amendments are welcome. The procedure is that they will be presented at Duluth for amendment and non-binding sense-of-the-meeting comments. Then whatever develops out of the Duluth consensus will be presented to the full membership in the fall for a vote by mail ballot. If approved, the new by-laws will take effect January 1, 1980.

Publications. We have asked the Math/Science Network of the San Francisco Bay area to do a career handbook on women in the mathematical sciences. Their grant has just come through from the Women's Educational Equity Act, and they will start work in July. The new career handbook will be aimed at junior and senior high school students, will include women from all areas of the country and on all career levels, and will be modelled after the highly successful science careers booklet "I'm Madly in Love with Electricity" (if you've never seen "Madly" you can get it from the Math/Science Network, Mills College, Oakland, CA).

And the AWM Reader has finally gotten a nibble from a publisher. If the nibble turns into a bite, we'll let you know.

Illegal questions. It is either clearly illegal or of questionable legality for a prospective employer to ask questions about the following topics during a job interview: age, marital and family status, religion, race, military status, financial arrangements, and arrest records. But prospective employers still ask such questions. They even ask such questions at AMS Employment Register interviews. I have written to Peter Lax, AMS president, to ask that the AMS formally discourage such questions. It is unfair to expect interviewees to protest during their interviews, but the rest of us might remind our colleagues of what the law says.

AMS/MAA elections. We have sent questionnaires to AMS candidates. This means that we will miss a few late candidates, but that our special AMS election issue has a chance of arriving at about the same time as the AMS ballots. HOLD YOUR BALLOTS until you get our election issue.

Deadlines make it impossible this year, but next year we hope to send questionnaires to MAA candidates as well.

AWM election. The Nominating Committee (Vera Pless, Alice Schafer, and Becky Struik) has come up with the following slate:

President: **Bhama Srinivasan**

Executive Committee: Louise Hay, Rhonda Hughes, Joan Hutchinson, Judith Longyear, Jill Mesirov, Evelyn Silvia.

August 24 is the deadline for any other nominations. The November-December Newsletter will contain candidates' statements and a ballot.

That's all folks. See you in Duluth.

Judy Roitman
Math Department
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Lawrence, KS 66045

LETTER FROM THE EDITOR

My apologies to "Everywoman, Ph.D." Due to an error on my part, her pseudonym was used by someone else in the May-June Newsletter. "Survival of the Fittest" ? was not written by the same person who wrote "Biding My Part-Timeness" and "Survival of the Fittest" I and II which appeared in '72, '75 and '76 issues of the Newsletter. I am sorry for any misunderstandings and confusion this may have caused.

My job hunt is happily finished. There were a couple of "lovely smile" and "you look like a young girl" type comments made at inappropriate times, but at least no one asked me any of the illegal, unethical type questions mentioned in Judy's report. Thanks to some good friends who let me complain about the injustices of life to my heart's content, I survived the stressful experience pretty well. And I'm delighted about my new position: associate professor at Western Illinois.

See the National NOW Times, June, 1979 for an account of the latest triumph of the Radical Right. S4, introduced by Senator Alan Cranston (D-CA) to provide federal support and funds for child care, has been killed. The UN IYC (International Year of the Child) is being vilified. Both were attacked as tactics of the "Early Child Developers" to get control of all children at the age of two to "change their values". Phyllis Schlafly's "Child's Declaration of Rights" is an amazing document consisting of 20 "rights", including "1. To have the love of a mother and a father who understand their different roles and fulfill their different responsibilities" and "12. To have an education that respects gender

identity so that the child will be able, upon maturity, to develop a lasting heterosexual relationship".

Please note my new address.

Anne Leggett
Department of Mathematics
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Macomb, IL 61455

NOTES FROM AWM COUNCILMEMBERS

Karen Rappaport, AWM Council Representative for Two-Year Colleges, sends the following notice:

> The Two-Year College Mathematics Association, AMATYC, is holding its convention in San Diego on October 17-20, 1979, at the Town and Country Hotel. The keynote speaker will be Professor Moshe Rubenstein of UCLA. Workshops on math anxiety and applications of mathematics are planned. Anyone desiring information should contact Professor Otten at the address below. Any special interest group, such as AWM, which would like a meeting should also contact Professor Elizabeth Otten, Southwestern College, 900 Otay Lakes Road, Chulavista, CA 92010.

Betty Anne Case, Tallahassee Community College, wants to remind everyone about the Infant Formula Action Coalition (INFACT): We have been asked, as a group or as individuals at the grocery store, to support the boycott of Nestle products in protest of their active promotion of powdered milk formula in Third World countries. (Nestle is a Swiss corporation, and no other means of dealing with them has been found.) This boycott is actively endorsed by many groups. Among them are labor groups such as United Farmworkers of America, church groups such as the National Council of Churches, student groups such as at Berkeley and Wellesley. More information is available from INFACT, 1701 University Ave. SE, Minneapolis, MN 55414.

From Harriet Kagiwada, AWM Council Member for applied mathematics:

Increasing the Participation of Women in Scientific Research is a 20-page report available from the National Science Foundation, Wash., D.C. 20550. It is a summary of the conference held October 1977 and of the Research Study Project Report dated March 1978.

She is on the Boards of Editors of the journals Applied Mathematics and Computation and Nonlinear Analysis: Theory, Methods, and Applications. She issues us a call for papers. Her address is: Hughes Aircraft Company, Canoga Park, CA 91304 (after September 1, request forwarding to El Segundo, CA).

The San Francisco Bay Area Math/Science Network meets on the first Thursday of each month at San Francisco State University from 6:30-9:00 p.m. All interested people are invited to attend meetings and to become involved in Network projects.

Welcome to a new Council member: Una Bray, Dept. of Math., Marymount College, 221 E. 71st St., NY, NY 10021. She is a mathematics instructor and director of the math lab.

WOMEN HONORED

Professor Sun-Yung (Alice) Chang of the University of Maryland, College Park, MD has received a Sloan Fellowship for 1980-81. Chang's field is real and complex analysis. She likes to work on problems that are classical in flavor, but with modern tools. At present, she is working on extending some one-complex-variable results to the bi-disc by using essentially real-variable methods. She plans to use the Sloan to visit other campuses in the U.S. and in Europe. Although her schedule is not yet firm, she is interested in spending time at U.C. Berkeley, Princeton University, and Mittag-Leffler Institute.

Professor Julia Robinson of the University of California, Berkeley, was presented an honorary degree by Smith College on May 20, 1979. She is the first woman in mathematics to have been elected to the National Academy of Science.

Dr. Thelma Estrin has recently been elected to the prestigious Board of Trustees of the Aerospace Corporation. She is the first woman member to serve on the Board. Dr. Estrin was also elected to the Board of Directors of the Institute of Electrical and Electronics Engineers where she represents 25,000 members in six of the Institute's thirty groups and societies. She also received one of four merit awards for Outstanding Engineer of the Year from the Institute for the Advancement of Engineering, Los Angeles, CA.

Carolyn Colburn Narasimhan, Northwestern University, received honorable mention in competition for an AMS Postdoctoral Research Fellowship.

Ruth M. Charney of the University of California, Berkeley, received an NSF Mathematical Sciences Postdoctoral Research Fellowship. She will use it for full-time research at the Institute for Advanced Study.

WHAT IS MATHEMATICS

by Julia A. Sherman, 3917 Plymouth Circle, Madison, WI 53705

As a psychologist working in the area of women and mathematics, I have developed a powerful curiosity about a question basic to the whole endeavor: "What is mathematics?" I solicit your responses and offer my own definition for your comment. Mathematics is a field of knowledge consisting of systems of symbols which are defined in themselves and in relationship to each other. The following statements may also be added in amplification. Some mathematical systems have been useful in that the relationships specified among the symbols corresponded to relationships found in naturally occurring phenomena. Hence, manipulation of symbols could substitute for manipulation of actual realities. In this way various outcomes could be "imagined" without doing them, a saving in time and energy. Also, in some instances mathematical systems have allowed prediction of events not yet observed in reality. Mathematics as taught in public schools generally consists of the most common of the mathematical systems, and particularly in simplified techniques for manipulating the symbols of the system without necessarily understanding itself or the concept of the system.

WOMEN IN SCIENCE AND TECHNOLOGY EQUAL OPPORTUNITY ACT: S.568

ed. note: Senator Edward M. Kennedy of Massachusetts has introduced a Women in Science act for the second time. The text of his statement issued on March 7, 1979 follows:

For fifty years educational, institutional, and cultural barriers have stood in the way of the participation of women in careers in science and technology. For fifty years we have systematically shut the doors on scientific careers for women by the time they are seventeen years old. For fifty years women have been denied equal educational and employment opportunities in scientific and technical fields. As a result, we have a scientific workforce which is dangerously close to being an all-male club. The proportion of women earning doctoral degrees in science is not greater in 1979 than it was in the 1920's. Only one-tenth of one per cent of engineers are women. Only 2 percent of physicists are women. Only 5 percent of chemists are women. Women seeking scientific and technical careers are experiencing unemployment rates three to five times higher than those of their male colleagues. Those women who are employed in scientific and technological careers earn less than men in every field, at every degree level, at every level of experience and in every employment setting. Minority and handicapped women have yet to achieve any measurable participation in careers in science.

The Women in Science and Technology Equal Opportunity Act which I am introducing today is carefully tailored to deal with the problems facing women in scientific and technical fields and to ameliorate the effects of half a century of discrimination.

The National Science Foundation has issued several reports in recent years which document in considerable detail the extent to which women have been denied equal opportunity

in science and technology. Those reports include: "Women and Minorities in Science and Engineering" (NSF 77-304); "Human Resources for Scientific Activities at Universities and Colleges, January 1978" (NSF 78-318); and "National Patterns of R&D Resources, Funds & Personnel in the United States" (NSF 78-313). The National Research Council's Commission on Human Resources issued its report "Women and Minority Ph.D.'s in the 1970's: A Data Book" in 1977.

How many breakthroughs in science might have come from the 50 percent of the population which has been so arbitrarily discarded? How much more rapid might have been our advances in areas of national concern? How many Nobel prizes might have been won? And how different might have been our present perceptions about the role of women in medicine, science, and engineering?

This situation is far too disturbing to be written off as the natural outcome of an educational and career ladder on which advancement is based solely on merit. We are so far from equal opportunity that even with a 10 percent improvement every year it will be another fifty years before talented women have equal access to careers in engineering, physics, and chemistry. It will take over thirty years for women to gain equal access to careers in mathematics. And it will be a quarter of a century before women have equal access to careers in biomedical research.

The National Science Foundation has described the underrepresentation of women in science and engineering careers as a "significant national problem". Nevertheless, those in the highest policy-making positions have failed to assign any priority to the funding or support of efforts to examine, understand and change the present situation. The White House Office of Science and Technology Policy, the National Science Board, the National Science Foundation, and the Office of Management and Budget have joined in recommending that just $1 million in a Federal research and development budget of over $30 billion be focused directly on this problem this year. And as small as this amount is, this recommendation is actually less than the amount allocated for these programs last year.

In hearings before my Subcommittee on Health and Scientific Research last month, Dr. Lilli Hornig, Chairperson of the National Research Council's Committee on the Education and Employment of Women in Science and Engineering, testified: "Less than 5 percent of all women scientists are employed [in Federal laboratories and agencies]; but only 3 percent of recent Ph.D.'s. This already low participation is further aggravated by unequal treatment on the job. For example, in the Department of Energy and its predecessor, the Energy Research and Development Agency, 85 percent of all male professionals were above Grade 12 but only 12 per cent of women. Conversely, 85 per cent of men but less than 1 per cent of women were at the top two grades."

In the academic sector there are also serious problems. 16 percent of graduates receiving doctoral degrees in science and engineering are women. Nevertheless, there are 27 major universities with chemistry departments of 28 or more professors in which there are no tenured women. There are 22 major universities with engineering departments of 28 or more full-time engineers in which no women are employed. There are 16 major universities with physics departments of 16 or more full-time scientists in which no women are employed.

A substantial amount of information has been gathered on the extent to which women are underrepresented in the scientific and technical workforce. Research into the nature of the barriers women face and means to overcome those barriers is yielding promising results. Various pilot programs have been funded, both in the private sector and by the National Science Foundation. The Foundation, for example, has tested methods which may prove effective in attracting more qualified women into scientific and technical careers. The American Association for the Advancement of Science brought together a group of women who had recently received doctoral degrees in science and engineering both to gather information concerning their own experiences as well as to develop recommendations as to steps which could be taken to alleviate the problems confronting women in scientific and technical careers in the government, academic and industrial sectors.

Later this month, the National Research Council's Committee on the Education and Employment of Women in Science and Engineering will issue its findings with regard to women in the academic sector. Assessments of the participation of women in science and technology in the government and industrial sectors are expected to be issued by the

Council later this year.

In 1978, the New York Academy of Sciences in cooperation with the Association for Women in Science Educational Foundation held a three day "Conference on Expanding the Role of Women in the Sciences". The results of that session are expected to be published shortly.

The information and recommendations which have been gathered thus far make it very clear that the appropriate agencies of the Federal government must devote more substantial attention to the role they can play in assuring that women have an equal opportunity to develop skills in mathematics and science and to pursue careers in science and engineering. At the same time, we must establish programs which will encourage academic institutions and industrial laboratories to assign higher priority to activities designed to enhance employment and advancement opportunities for women with scientific and technical skills.

A concerted and long term effort must be made to bring these changes about and to expedite the process. That effort must involve students, parents, teachers, counselors, administrators, academic institutions, industry and the federal government. A comprehensive approach is required to provide equal education, training, and employment opportunities for women in science.

To begin the Federal effort, and to focus national attention on these concerns, I am introducing today the "Women in Science and Technology Equal Opportunity Act". The bill establishes a ten year, $250 million program to apply the resources and leverage of the National Science Foundation and the Federal government to the achievement of equal opportunity in science. The bill provides:

* funding at the elementary, secondary, and college level to encourage women to pursue courses in science and math;
* research and information programs to help women enter scientific and technical careers;
* programs to increase public awareness of the importance of full participation of women in the scientific and technical workforce;
* incentives for those individuals and institutions which demonstrate a record of achievement in encouraging women to study science and math and in providing employment opportunities for women;
* reporting procedures to measure programs and to help identify problem areas; and
* enforcement provisions to assure full compliance with all requirements relating to equal opportunity for women in science.

The legislation I am introducing today reflects the results of last year's hearings on S. 2550, a similar bill which I sponsored last year, and the comments of over 400 individuals and organizations who provided assistance in reviewing specific provisions.

All programs in the bill are designed to make maximum use of existing Federal programs, and to encourage the involvement of the private sector. The bill assigns the lead agency responsibility to the National Science Foundation and provides for full participation of groups with expertise assuring equal opportunity for women, especially groups involved in the advancement of women in science. Moreover, the bill places special priority on efforts with the potential to bring about comprehensive and long-term institutional change relating to the participation of women in science and emphasizes fields of study and employment in which the underrepresentation of women is most serious and in which existing public and private activities are insufficient.

Clearly, federal legislation alone will not change patterns whose origins are as complex as those which characterize the present situation. That Federal effort will have to be accompanied by a new commitment on the part of the scientific community, educators, counselors and administrators. It will require far greater involvement of parents in encouraging young women to persist in acquiring the basic skills which are the entrance requirements for an ever increasing number of professions. It also holds substantial promise for those students who decide against scientific and technical careers. It will increase their ability to function effectively when faced with decisions for which basic science and math skills and understanding are required.

It is my conviction that this kind of comprehensive effort will enhance this nation's scientific and technical strength. It will contribute to the standard of excellence which has been the hallmark of our scientific and technical enterprise. And it will assure that all of our talented students and researchers are given a full opportunity to pursue careers which are among the most challenging and rewarding that our nation has to offer.

RESEARCH PROJECT ON SEXUAL HARASSMENT AND ASSAULT

Women who have been sexually harassed and/or sexually assaulted (in the past or at the current time) in the academic setting/medical setting/dental setting are needed for a nationwide study. Sexual harassment in the health setting has been studied to some extent, but sexual assault has not, and sexual harassment in academe, which many of us have experienced as students (undergraduate and graduate) or faculty members, is still kept private. Such privacy enables the victimizer to continue his unethical behavior without any fear of punishment. Help expose the problem. Study will include questionnaire and interview, and all responses will be kept strictly confidential. Contact Ruth Schwartz at 212/377-4945 or write to her at 2509 Avenue K, Brooklyn, NY 11210.

ERA PANEL

edited version of talk by Chandler Davis, University of Toronto, at the AWM panel in Biloxi, January 27, 1979

I would like to start with a quotation from Melissa Thompson of the National Organization of Women:

> What does the Equal Rights Amendments really mean? Money! Money in the pockets of women. The heart of all discrimination against women is money, whether it is state marriage property laws giving ownership and control to the male spouse or Federal laws limiting a woman's access to the military and its training and jobs.

This is an interesting perspective on the Equal Rights Amendment. Superficially it seems inappropriate to an amendment which begins by saying, in language reminiscent of the Declaration of Independence and the 14th Amendment to the Constitution, that "equal rights before the law" shall not be abridged. A more obvious interpretation is that this is a matter of equal status before the law: formal equality. Then to be told that it is a practical measure!

This evolution is not a recent one. The first active workers in the suffrage movement of the 19th century emphasized formal equality: it simply wasn't fair for women to be denied the vote, since they were residents and citizens. But after 1880 practical, instrumental arguments were given for women's suffrage.

The Equal Rights Amendment campaign, which has been continuous for more than fifty years, was started by the same people who had just finished winning the right for women's votes on the national level -- foremost, Alice Paul and the National Women's Party. Hardly breaking stride, in 1923 they turned to campaigning for ERA, and this proposal also picked up practical arguments pro and con.

Now I think the practical arguments are important. I don't think the fine sound of a call for equality should command our automatic assent. Such simplistic thinking can lead us astray. Should we say that every society -- virtually all past societies, Africa, Asia, what have you -- which has significant sexual division of labor therefore has tyranny of one sex over another? This would be patronizing toward cultures which have their own ways of dealing with their problems, and naive on our part. It may well be better for the needs of some societies for the sexes to have separate spheres. It is conceivable that the same could be true for our culture; most of us have decided that we don't believe it, but we must base our conclusions on a practical look at economic relations, not just on the rhetorical appeal of "equality before the law".

There is a second, more hard-hearted and closer-to-home, reason to let the practical intervene in principled talk of Equal Rights. Given the discrimination against women up to now ("now" being 1923, or 1979 for that matter), women are disadvantaged. A foot race between contestants one of whom has a large headstart, is not a fair foot race. We can't lightly dismiss this effect; we must ask whether women's disadvantage in our society makes it false fairness to enact formal equality now. Indeed, before the First World War most of the left ignored matters of formal equality, opposed the Equal Rights Amendment, and (if interested in legislative measures at all) worked for protective legislation for women. Fanya Cohn of ILGWU said later,

> I did not think the problem of working women could be solved in any other way than the problem of working men and that is through trade union organization, but considering that very few women are as yet organized into trade unions, it would be folly to agitate against protective legislation.

Nowadays this has changed. Though women are still worse paid and less unionized than men, nobody sees much hope for them in protective legislation for women; the Congress of Labor Union Women is actually against it. The change is largely a recognition of the practical observation that the protective legislation didn't address a main problem, women's unequal access to jobs. Since the Second World War, under the principle of formal equality, legislation has addressed this problem, notably Title VII of the Civil Rights Act. The Equal Rights Amendment could provide an additional legal lever against job discrimination.

Let's understand the economic competition between women and men today. The obvious picture is of an independent woman and an independent man, both heads of household, applying for the same job. This situation occurs and is important, to be sure, and legislation may help make it fair. But it is not the typical case in our times. In 1940, 15% of wives worked; in 1976, 45% worked. The percentage was highest in the lower-income group; wives of males with salaries over $10,000 were hardly more than half as likely to be working as wives of those with salaries $3000 to $7000. Today the woman worker is, much more than before, part of a family unit which also includes a man against whom the woman is not competing.

A second change in employment patterns is that women appear in new categories. There are more women letter carriers, there are more women physicians. This effect is distributed selectively: categories where growth in number of women is especially large, are categories where the growth of total number employed has also been large. So in our trade, where the total number of jobs has not increased much for ten years, the percentage of women has stayed roughly constant. The primary cause must be the stubborn hanging-on to desirable jobs by men in areas of work where there is not enough expansion to leave shortages. It is parallel in blue-collar work: those unions which have been least open to organization of women have been in traditionally male trades where the number of jobs was static. Let me give just one example of this selectivity. A major economic category into which women have been entering is "managers and administrators", where they were 12% in 1940, 21% in 1976. Sure enough, this is a category which grew enormously (relative to the total labor force) during that interval.

What is the economic role of the working wife? She is very unlikely -- much less likely than her working husband -- to go to work motivated by a long-term vocational commitment. She goes to work to earn extra. The family is now better off with two earners, first because there is more income, and second because it is protected against recession, the danger of both getting laid off being less than the danger to a lone wage-earner. (In fact it turned out in the 1974 recession that the spouse more often hit by lay-off was the husband.) Where there is self-identification of the woman in vocational terms, it most often arises after she has gone to work as a back-up for her husband's earnings.

Because such families predominate, we have to evaluate the importance to them of economic equality for women. Why should they care, for instance, about equal pay for equal work? Let pay be raised for the man or for the woman, it goes to the same family budget anyhow. Why should they care if women were last hired, first fired? Just so one of them keeps bringing home a pay-check.

Ah, but equalizing economic opportunity does still affect them! It alters the balance of respect within the family, the estimate of their relative worth and potential made by themselves and their children. By giving wife as well as husband the alternative of

leaving the partnership and making it on her own, it tends to equalize the bargaining position from which they conduct disputes within the partnership. In saying this I'm not attacking marriage. (My own suits me fine. I'd say only those marriages need dissolving which need dissolving.) Parity between spouses should strengthen relations between them, strengthening thereby the economic and emotional and intellectual life of both. The man's feeling that the responsibility for the family is uniquely his, is a burden. It is a burden to the woman to feel that she is trapped, that her dependence means she can't afford to express herself honestly to her husband. To shed these burdens will improve all of our lives.

Economic equality can be sought in many ways, mostly non-legislative, and important laws are already on the books as I've mentioned. Still, Melissa Thompson is quite right: ERA can help. By being entrenched in the Constitution, and by the simplicity of its language, it can settle without a lawsuit issues which would take a suit if they depended on complicated sub-clauses. ERA can prevent disparity in alimony standards, in legislation providing widows' or widowers' benefits, also in insurance (since insurance is so thoroughly interwoven with regulatory legislation). Even in areas outside ERA's legal reach, its clarity and prestige will extend to deter economic double standards.

WOMEN MATHEMATICIANS BEFORE 1950

planned, moderated, and edited by Pat Kenschaft, Montclair State College

AWM sponsored a panel on "Women Mathematicians before 1950" at the summer meeting in Providence, R.I., on August 9, 1978. The speakers were Dorothy Bernstein of Goucher College, M. Gweneth Humphreys of Randolph Macon Women's College, Anne F. O'Neill of Wheaton College, and Mina Rees of City University of New York.

Dorothy L. Bernstein

In looking over the article by Judy Green in the April, 1978, AWM Newsletter, "American Women Mathematicians - The First Ph.D.'s", I discovered that I had a direct connection with two of them - Florence Allen and Clara Bacon. Florence Allen, a 1907 U. of Wisconsin Ph.D., was still there as an instructor when I arrived as a freshman in the early 1930's; I think she taught me analytic geometry. I know I shared an office with her in 1941 when I was back as an instructor myself. Clara Bacon, who received her Ph.D. from Johns Hopkins University in 1911 and was Hopkins' first woman Ph.D., I believe, and Florence P. Lewis, a 1913 Hopkins Ph.D., were for many years the mainstay of the mathematics department at Goucher College, where I now teach. They started the tradition of an unusually strong mathematics curriculum for a woman's college, a tradition which has been steadily maintained to this day, under a succession of women chairmen.

But to return to Wisconsin - it was an exciting time to be a student, since Alexander Meikeljohn's experimental college was just finishing its short but brilliant career at the university, and one of its legacies was the system of advanced independent study, in which I spent my junior and senior years. For two full years, including summers, a student was allowed to study his major subject on his own, attending such lectures as he desired and talking with any member of the department he wished, but with no exams or grades. He was expected to write a thesis during his second year and take a comprehensive examination at the end of the period. On the basis of these two things (the thesis and the single examination), he was awarded either a B.A. degree or B.A. and M.A. degrees, together with the appropriate number of credits and a single grade that was determined by the department. Most students, of course, were unwilling to take the gamble, but the few of us who did thoroughly enjoyed it. In my case, I would study some subjects like advanced calculus or introductory abstract algebra for a month at a time, by myself, meeting weekly with my advisor, Mark Ingraham. For other things, such as complex variables or Galois theory, I attended the regular graduate course lectures. My thesis was on finding complex roots of polynomials by an extension of Newton's method. I received my B.A. and M.A. degrees at the end of four years and then returned to Wisconsin for an additional year of graduate work as a teaching fellow. Besides Professor Ingraham, I especially remember among my

teachers Rudolf Langer and C. C. MacDuffee. All three encouraged me to continue graduate study in mathematics, but at another university.

So I came to Brown in 1935 and here became aware for the first time that some people made a distinction between men and women in mathematics. For example, I was assigned to teach a course in remedial algebra at Pembroke College, then a separate college for women at Brown, and Hugh Hamilton was assigned to teach the same course to the Brown boys. When we discovered that I had 3 girls in my class and he had 45 boys, it seemed natural to both of us, he from California and I from Wisconsin, to make two classes of 24 students each. But the chairman, C. R. Adams, would not hear of the idea, saying that the Brown boys would not stand being taught by a woman instructor. I pointed out that I had taught boys in Madison the previous year, but nothing was done, and we continued for a full semester - I with 3 girls and Hamilton with 45 boys.

There were five or six women graduate students in mathematics at Brown at the time, and though we felt a bit isolated, our fellow graduate students accepted us readily. I enjoyed my courses and began to think of writing a thesis in analysis under J. D. Tamarkin; but first I had to take my qualifying exams, or prelims. I did this after one year at Brown; they consisted of two full afternoons -- about eight hours -- of oral examination by the entire Brown mathematics department. It was quite an ordeal, but I was able to answer everything they asked. I found out later that some of my fellow graduate students had prelims which lasted only two or two and one-half hours. When I asked Professor Tamarkin about this, he admitted that my exam was extra long for two reasons: I was a woman and I had taken most of my courses at a Midwestern university. I am not sure which of the two was more prejudicial. (By the way, Brown's attitude toward women was typical of many other universities at that time -- my experience is an illustration.)

I wrote my dissertation on multiple Laplace transformations. As in many analogous cases, the jump from one to two dimensions was by no means trivial and it turned into a very interesting problem with many ramifications into functions of several complex variables, functions of bounded variation in higher dimensions, and partial differential equations.

Meanwhile, I left Brown for my first full-time teaching job, as instructor in mathematics at Mount Holyoke College. I cannot resist one more Brown story in this connection. It concerns R. D. D. Richardson, who was Dean of the Brown Graduate School and also Secretary of the American Mathematical Society for many years. In his latter capacity, he was consulted by many people about hiring personnel -- I have heard stories, perhaps exaggerated, that he was a one-man employment bureau for mathematicians throughout the country. I do know, however, that when I came to see him, as we all did, about a college taeaching job, he took out a map of the United States, covered the region west of the Mississippi and said: "You can't get a job there, because you are a woman." Then he covered the part south of the Ohio River and said: "And you can't get a job there, because you are Jewish." So that left the Northeast quadrant. Well, it happened that I heard of a job at Mt. Holyoke and after a visit to South Hadley, I got the position. When I told the Dean, he expostulated "But I had that job all reserved for Hamilton!"

I was at Mt. Holyoke from 1937 to 1940, meanwhile receiving my Ph.D. from Brown in 1939. Then I returned to Wisconsin and was an instructor at the university. During that time my mathematical interests expanded to include general integration and measure theory. I worked on this with Stan Ulam who was also at Wisconsin. Meanwhile the United States had entered World War II and in June, 1942, I went to the Statistical Laboratory of the University of California at Berkeley as research associate to Jerzy Neyman. They were doing a lot of secret computing for the Army, mostly with desk calculators, and I remember Evelyn Fix and Elizabeth Scott working steadily to all hours of the night in order to compile long lists of figures which they would mail every morning to Washington. I worked on theoretical problems in probability which Professor Neyman gave me, and also taught a graduate course in probability theory in the mathematics department. However, after eight months, I left -- Neyman and I did not see eye-to-eye on what was the mathematical justification of a statistical procedure. Of course, since then I have learned that this is not unusual -- mathematicians and statisticians do have fundamentally different points of view, even though they may use the same techniques.

After a few months of unemployment, I came to the University of Rochester in 1943 and stayed there happily until 1959. I began teaching on the women's campus, but was soon transferred to the men's campus, or "river" campus, which had a Naval V-12 Unit. After the war I stayed on the river campus; by then all upper-division and science courses were taught there, with the girls commuting to their classes. Indeed, a few years later the University of Rochester became officially coeducational and the river campus had classes and dormitories for both men and women. I taught both undergraduates and graduate students and rose through the ranks to full professor.

Soon after I came to Rochester, C.B. Tompkins who was working at Engineering Research Associates on an ONR contract under Mina Rees asked me to undertake a study of what was known in existence theorems in partial differential equations, since some of the proofs could be used as basis for the computational solutions of non-linear problems that were just being tackled by high-speed digital computers. This resulted in a book: Existence Theorems in Partial Differential Equations, published by Princeton Press, which appeared in 1950, while I was spending a sabbatical year at the Institute of Advanced Study in Princeton.

This is the end of the period we were supposed to discuss, according to my understanding of the assignment, so I will pass over the next 28 years by saying that I was at Rochester until 1959, except for a sabbatical year at the Institute for Numerical Analysis at UCLA. Since 1959, I have been at Goucher College, again with the exception of 2 sabbatical years, one as Visiting Professor of Applied Mathematics here at Brown, and the other spent half at Brown and half at the University of Tennessee. I have continued research and teaching and have become particularly interested in how to combine pure and applied mathematics in the undergraduate curriculum, but that is another story.

I would like to speak briefly about the contrast between attitudes and opportunities for women with bachelor's degrees in mathematics in the late 1930's and at the end of the period we are discussing, 1950. Before World War II, the only opportunities open to them were high school teaching, a few civil service jobs doing mostly routine statistical calculations, a few low-level actuarial jobs, and graduate school with the remote possibility of a college teaching job at the end. This changed drastically after the war, for two reasons. During the war, women had taken jobs formerly held by men and had shown they could handle them, and also the computer explosion opened up many new areas to mathematics applications with many new jobs resulting from this.

On the other hand the attitude of women also changed. In 1950, most of the women graduating as mathematics majors, like most of their sisters, were interested only in getting married and raising a family. The numbers going to graduate school and entering professions decreased markedly. In contrast, before WW II, there was a slow but steady number of women going seriously into mathematics. For example all six of the women who were graduate students at Brown when I was there continued in mathematics. Some married and some did not; but they are all, or were for many years, college teachers, industrial mathematicians, editors of mathematical journals, and so on.

One final observation: There always has been a very nice, strong tradition of older women in mathematics helping younger ones as much as they could. Julia Bower, who has a Chicago Ph.D., 1932, reminded me yesterday of Anna Pell-Wheeler of Bryn Mawr, who was very helpful in this way. I remember Marie Weiss and Marie Litzinger, both of whom died relatively young, as being very supportive. But then, I can also say that, with a few glaring exceptions, the men I have known in mathematics have been equally kind and generous in their support.

M. Gweneth Humphreys

My interest in mathematics was aroused in high school, and I carried out a major in it at my hometown university -- University of British Columbia. I was a proficiency scholarship student and was encouraged to expect an assistantship while working on a master's degree there. That's when the depression caught up with me -- the year I graduated, 1932, the decision was made to reduce costs at the university by not accepting any new graduate students in mathematics. So at the suggestion of one of my professors,

I applied for financial aid to a number of institutions in Canada and the United States, including in my ignorance and the professor's absent-mindedness Princeton University.

The only fellowship offered was by Smith College, and a fellowship was financially necessary. At Smith I had my first women professors of mathematics -- Miss Wood in analysis and Miss Rambo in geometry. My work in algebra and my thesis in matrix theory were with Neal H. McCoy. After a good year there I was fortunate enough to receive a fellowship at the University of Chicago.

If you have read Bill Buren's article in the 1976 Monthly, you know there was quite a group of women graduate students at Chicago in the late 20's and early 30's. I came along too late for most of them, but as fellow students I knew Frances Baker, later of Vassar, Tony Killen Huston of Renssalaer, and Ruth Rasmussen of the Chicago Colleges; Marie Litzinger of Mount Holyoke came one summer. Chicago also had its woman professor -- Mayme Logsden, herself a 1921 Chicago Ph.D., who remained there until she retired in 1946. Then she entered a second career at Miami University until her second retirement in 1961 at the age of 80!

My chosen field at Chicago was number theory and my dissertation was on the Waring Problem with advisor Leonard E. Dickson.

The University of Chicago was a good place for a woman to study mathematics then. I was completely unconscious of any kind of discrimination, except possibly the fact that I was not allowed to teach for my fellowship and some of the men were. However, there may have been good reasons for that -- I couldn't say.

The job market was bad in 1935 when I finished. Only one university opening was reported to the Chicago department from January to August and another candidate got that. A teacher's agency came through for me, however -- a piece of luck for me at someone else's expense, I'm afraid. It was a substitute for an ill person. The salary involved living expenses and was evaluated by the IRS as $1400 -- below the going rate of $1800 for a beginning Ph.D., but riches to me then.

The next year I went to Newcomb College of Tulane University to fill the vacancy left by Marie Weiss' move to Vassar. From then on my progress as to salary and rank was upward although slow. Not like Marie's, who told us later that in her first few years at Newcomb, in the depths of the depression, her salary went down each year.

The head at Newcomb was Nola Lee Anderson, who had a Ph.D. in geometry from the University of Missouri. She was a clever and a happy person to work with, but two years later she left to marry E. S. Haynes, an astronomer of the University of Missouri. Later Nola Lee was a member of the department there until retirement about 1970.

When Nola Lee left, Marie Weiss came back to Newcomb as head of the department and we worked together for 11 years. She was brilliant and always centrally involved in the affairs of the college. Her mathematical interest was in group theory, her Ph.D. from Stanford, and she had been a National Research Fellow at the University of Chicago. She was also one of the group who studied with Emmy Noether at Bryn Mawr about 1934. Through her I met some others of that group -- Olga Taussky Todd of Cal Tech and Grace Shover Quinn of American University.

Marie believed that undergraduates should have a course in abstract algebra and gave a convincing talk to an Association meeting on this subject. That was back in the thirties! She wrote one of the very early and successful texts for such a course -- revised by Roy Dubisch after her untimely death in 1952.

Marie was active in AAUP and held a national office in it at one time. She was a forceful person and the following anecdote is an example of an early feminist protest.

A group of women professors was waiting to be seated in a crowded restaurant in New Orleans one evening and Marie noticed that several groups with men in them were seated ahead of us out of turn. So she told the man in charge quite vigorously -- and appropriately -- "Our money is as good as theirs!" She was successful; we got the next table.

My acquaintance with women mathematicians widened through meetings and conferences. I met the other members of this panel in this way. At meetings at Duke University about 1938 I remember meeting Julia Bowers of Connecticut College, and a vivacious Southern woman, Billie Larew, who hired me to come to Randolph Macon Women's College in 1949.

Miss Larew was a 1916 Chicago Ph.D. and was a charter member of the Association. She became department head at Randolph Macon about 1936 and dean of the college in 1949. She had an unusual ability to write and speak effectively and had great influence in the college and with the alumnae. She was also very active in AAUW.

Another Chicago Ph.D. was a member of the Randolph Macon mathematics department -- Evelyn Wiggin, later Casner. She was my staunch supporter while I was chairman and she was still alive. She was much beloved by her students.

In 1947 at the Canadian Congress Seminar at the University of Toronto I met several other women mathematicians including Grace Bates of Mount Holyoke and Mary Dolciana (Hunter) of textbook fame. Anne Stafford, who taught at the University of Utah, was there and Christine Williams of Penn State. There were others whose names I don't remember.

Two younger women mathematicians I met at meetings are Annette Sinclair and Aileen Hostinksy, both Illinois Ph.D.'s before 1950. Annette's career has been mainly at Purdue and Aileen's at Penn State and Connecticut College. I remember Jewell Hughes Bushey once reporting on the small percentage of women among the members of the AMS and MAA. There were few women at meetings but considering the list I've just given -- and there were many others I'm sure -- there were quite a few of us, after all, before 1950.

Anne F. O'Neill

I was born in upper New York State, in Troy, New York, and received my early education in that area. I don't recall anything special from my grade school experiences, but I do remember vividly two of my high school teachers -- the one who taught me science and the one who taught me mathematics. I'm sure that they had an impact on my future. They were both middle-aged (or so it seemed to me) cheerful, jolly women. They stood for no nonsense from anybody but really liked teaching, and I owe a lot to them.

After high school I went to Vassar College, which in those days was strictly a college for women; it has since then become coeducational. I became a math major, one of about a dozen math majors in my class of 1938; the size of that class was 263; there were about 1200 students at Vassar in my senior year. I had some very good teachers -- all but one of them a woman. My teachers included Mary Evelyn Wells, Gertrude Smith, Grace Hopper and Marie Weiss. There was one lone man, Henry S. White, whom we called "Pop White". He was quite a character, but not as good a teacher as the women.

I can't recall why or when I decided to teach college mathematics, but to do this my college teachers told me I should first get the Ph.D. They encouraged me to go to Harvard for my graduate work, so I enrolled at Radcliffe Graduate School, where all the graduate students studied under Harvard faculty. At that time there were some truly outstanding mathematicians at Harvard -- all of them men. The elder Birkhoff (George David) was alive then; so was W. C. Graustein. Also at Harvard were Garrett Birkhoff, Saunders MacLane, Marshall Stone, Hassler Whitney, David Widder, B. J. Pettis, and Joseph Walsh.

There were only a few women graduate students in mathematics each of the four years I was there. I remember six of them by name:

Jeanne LeCaine Agnew (1941), now at Oklahoma State University
Helen Kelsall Nickerson (1949), here today and now at Rutgers University,
Ellen Fedder Buck, married to R. Creighton Buck at the University of Wisconsin,
Esther Comegys, now retired from the University of Maine,

and two others that I have lost track of, Jean Burr and Jessie Collinson. In the years 1939-45 there were only three women to get the Ph.D. in math at Radcliffe: Jeanne LeCaine and Esther Comegys in 1941 and me in 1942.

There weren't many women, but there were a lot more men as graduate students in mathematics -- about a dozen each year, I would say. Some of them were teaching fellows. No women graduate students were teaching fellows when I was at Harvard, but during the war at least one women was a teaching fellow. I don't recall this was ever an issue with us at graduate school, but I suppose it was one way in which women were discriminated against.

However, I do recall a minor uproar concerning the meetings of the Harvard Mathematics Club. This club usually had its monthly meetings in the evening, in the parlor of one of the men's dorms, and women were not permitted in that dorm in the evening. So we women graduate students got together and decided this simply was not fair; we got hold of one of the officers of the club (or its faculty advisor) and complained to them. They quickly saw the reasonableness of our request that the location of the meetings be changed to some other place, and they did precisely that! There was no great problem, no real confrontation.

One result of there being so many more men than women graduate students in mathematics was that the women got invited to all the parties while the men were invited in shifts. I recall the Grausteins having a series of three parties, with a third of the men invited each time. But the women were invited to all three! We did have lots of fun.

I received my Ph.D. in June, 1942, having done my thesis in Analysis under Marshall Stone. In the following September I did my first teaching; this was at Smith College. Note that I had done no teaching at all until after I had my Ph.D. I have often thought what a disaster it would have been if I hadn't liked teaching after all this. But fortunately I loved teaching! I believe that conditions have changed now, so that even the women have the opportunity to do some teaching while in graduate school.

The manner in which I obtained this first job seems to have been quite informal -- casual, almost. In the spring of the year in which I was finishing my Ph.D., Neal McCoy (chairman of the Math Department at Smith) told Saunders MacLane (who was still at Harvard) that there was an opening at Smith for a young woman Ph.D. for the fall, 1942. Saunders told Marshall Stone and he told me, and so I set off to Northampton to be interviewed for the job. In those days there was rather good train service between Cambridge and Springfield and I was able to go out to Smith to be interviewed and to return to Cambridge the same day. One reason why the Smith people were so casual about this whole thing may have been that they had been through the procedure the previous year, when they had hired Jeanne LeCaine. She had stayed only the one year at Smith, returning to her native Canada to do war work.

I left Smith in 1952 to go to Wheaton College in Norton, Mass., where I have been on the faculty ever since. Wheaton is a college for women, and a few years ago we decided to remain so. The student body totals about 1200. Every year there are a few guys on campus as full-time students, but they are only visiting us on the 12-college Exchange Program, and they return to their own institutions to graduate. Incidentally, Wheaton is located in southeastern Massachusetts, only about 18 miles from here, so we have lots of Brown students visiting our campus socially.

When I went to Wheaton, Hilda Geiringer von Mises was the chairman of the department. She was a very lively person, one who really loved her work, and indeed she spent most of her time on her research and published a great deal. She had a lot of influence on my further developments in mathematics; she got me interested in her special field, mathematical statistics -- so much so that I spent my first sabbatical and a later leave of absence studying statistics, and took on the teaching of the courses offered in the math department in this area when Hilda retired.

I had my first sabbatical in 1958-59. I started it by attending the International Congress in Edinburgh in August, 1958, and then went to London to study mathematical statistics at University College. There I found a very good friend in Dr. Florence N. David; she taught me a lot of mathematics and was wonderfully kind to me during my stay at London. I saw her again in 1961-62 when I spent a year's leave of absence at Berkeley in the department of mathematical statistics. Dr. David had by then moved to California. At Berkeley that year I got to know Evelyn Fix, Elizabeth Scott, and Jerzy Neyman.

Whenwhile, Helen Kelsall Nickerson's career has run remarkably parallel to mine. She was class of '39 at Vassar; she completed course requirements at Radcliffe and was in residence there from '39 to '42. She married, and she and her husband went to Wheaton in '42. He taught biology, and she had a baby. She taught mathematics at Wheaton from 1943 to 1950 with a year off in 1947-48 during which she finished her thesis, thereby obtaining her Ph.D. in 1949. Our careers overlapped at Vassar and Radcliffe; she followed me at those two places, but she go to Wheaton before me!

At Wheaton I was given tenure early on and promoted quickly to full Professor. I also became chairman of the department early because Hilda didn't want to be bothered with it. We have had some really excellent math majors at Wheaton; one of them has received the Ph.D., two others are Ph.D. candidates, and more of them have taken an M.A. in mathematics. Most of them, however, take jobs in industry and do rather well.

Before concluding, let me say that nobody ever discouraged me from studying mathematics; no one ever told me that a woman didn't get a Ph.D. in mathematics. Maybe someone should have discouraged me, but the fact is -- no one ever did.

In conclusion I should like to say that there have been four women mathematicians who had tremendous influence on my career, namely, Miss Flint (my high school teacher), Mary Evelyn Wells (at Vassar), Hilda Geiringer (at Wheaton), and Florence N. David (at London). To them I owe a great deal.

Mina Rees

I have been asked to include a large dose of autobiography. This I do with some difficulty, resorting to quotations to assist in making certain value judgments. My A.B. was from Hunter in 1923, my Ph.D. from Chicago in 1931.

After Chicago, in the midst of the depression, I returned to Hunter to resume the usual duties associated with academic life. The decisive event in my life came in 1943, when I accepted a wartime job that introduced a whole new orientation into my career. This was an invitation to join the staff of the Applied Mathematics Panel of the Office of Scientific Research and Development (ORSRD) when the organization to handle scientific war work was reorganized in 1943. I became Technical Aide and Assistant to Warren Weaver, the Chief of the Applied Mathematics Panel.

Why do I call this change decisive? First, because it greatly broadened my awareness of unfamiliar fields of mathematics and my contacts with mathematicians; and, second, because it greatly increased my understanding of the character and activities of many of our major educational institutions and of the structure and operations of the government including the military establishment. In short, it gave me the kind of experience that made it appropriate for me to be invited to become head of the mathematics research program of the Office of Naval Research when that Office was established after the war.

Because of the importance of the Applied Mathematics Panel in this tale, I think I should say a few words about what it was and what it did. The National Defense Research Committee (NDRC) had been set up even before the United States entered WWII to provide scientific assistance to the military. There was no mathematics division. Warren Weaver, who was at that time Director of the Natural Sciences Division of the Rockefeller Foundation and had been professor and chairman of the mathematics department at the University of Wisconsin, was head of a section of the Fire Control Division to which had been assigned the specific task of developing an Anti-Aircraft Director that would serve as an essential component in the system that was needed to protect Britain from German bombing. By the end of 1942 that task had been brought to a spectacularly successful conclusion in the production of an AA Director that shot down every single buzz bomb that came over the part of the east coast of Britain to which the AA Director had been assigned for tests. It was at this time that NDRC was reorganized to enable it to perform its tasks more completely, reflecting what it had learned from its early experience. And it was then that Vannevar Bush, who headed the new OSRD of which NDRC became a part, decided to establish an Applied Mathematics Panel (AMP) to help with the increasingly complex mathematical problems that were coming to the surface as well as with those other problems that were relatively simple mathematically but needed mathematicians to formulate them adequately.

Dr. Weaver set up an official government body, the Applied Mathematics Panel, which, like comparable bodies handling other aspects of scientific war work, wrote contracts between the government and various universities to provide, in our case, mathematical services when they were requested to do so by AMP. There were, of course, mathematicians engaged in many parts of the war effort: in the War Policy Committee, in the armed services (in uniform - Herman Goldstine; as civilians in government establishments -

E. J. McShane at Aberdeen; in Operations Research Units attached to the Air Force - G. B. Price), on war tasks in industry (Westinghouse, RCA, BTL), in training programs at colleges and universities, and in other divisions of OSRD including the Radiation Lab and the Manhattan Project. AMP was to provide additional mathematical assistance to the military and to other divisions of OSRD when they were asked for it provided they considered that they had a reasonable chance of doing something useful. The Panel set up contracts with Princeton, Columbia, New York University, Berkeley, the Franklin Institute, Brown, the Institute for Advanced Study, Harvard, the Carnegie Institution of Washington, Northwestern, as well as with the Mathematical Tables Project (originally established by the WPA). Many of the country's ablest mathematicians were employed under these contracts and many moved from their home universities in order to participate. Among others there were MacLane, Albert, Courant, Friedrichs, Prager, Leighton, Garrett Birkhoff, Wilks, Mosteller, Abraham Wald, Allen Wallis, Milton Friedman (the last two operating as statisticians). The members of the Panel itself, all government appointees, included, among others, Thornton Fry, Marston Morse, G. C. Evans, H. P. Robertson, A. H. Taub, Oswald Veblen, Richard Courant. This was the policy committee that decided whether it made sense for the panel to undertake a project. And it was Courant who was responsible for my being invited to join the staff of AMP as a civil servant. It was not because I was an applied mathematician - my degree was in Abstract Algebra; it was not because I was a woman - there was no equal opportunity then. It was the good old buddy system. Let me explain.

I was at Chicago from 1929-31. In the summer of 1930 I attended my first summer meeting of the mathematicians here at Brown. What I remember most clearly about that meeting was that I had breakfast with Marston Morse and G. D. Birkhoff. I found the experience overwhelming, and I was enchanted with mathematicians and, at least partially because of that, with mathematics. When I returned to New York I continued my attendance at meetings, both winter and summer. And so it came about that, when Courant was visiting lecturer of the Society, I met him at a meeting, and continued my acquaintance with him when he came to NYU. Though I was not a research mathematician and though I soon learned that I couldn't understand much at the meetings, I did find them useful in giving me some idea of the directions that mathematical research was taking. I might add that I understand even less now.

When AMP was being organized Courant recognized that Dr. Weaver would need administrative help as well as mathematical help, and suggested my name. Mathematical help was being provided by Sam Wilks, Ivan Sokolnikoff, Hal Germond, and, later, by Don Spencer. The job involved contact with the work going on under all contracts and attendance at all Panel meetings. There were trips to military installations, including headquarters in Washington, in the company of appropriate contract personnel, to clarify the problems we had been asked to help with, to determine the likelihood that we could do something useful, and to formulate recommendations to the Panel which met weekly. There were reports on projects completed to be published and circulated to people with a legitimate interest in the problem both in this country and in England and Canada. There were monthly and, later, bi-monthly reports to be prepared and distributed, reporting on progress, or lack of it, on projects that had been undertaken by the Panel but not yet completed. There were endless administrative details to be handled as the Panel carried on a broadly based effort to bring mathematics to the service of the war effort. When the time came to close up shop, the Panel had some spectacular successes. Its work was much appreciated.

My work with the Panel lasted until the end of the war in 1946. It gave me familarity with the work of many of America's most able mathematicians; and it gave me considerable understanding of the changes that were occurring in mathematics as a result of experiences in World War II: the emergence of mathematical statistics in its great variety; the development of the computer and the need for extensive work in mathematics to insure a sound exploitation of the potential of the computer; the clear opportunity to extend the use of operations research to important new areas; the potential, through the use of computers, for more applicable results in analysis.

When the Office of Naval Research was established after the war, it was natural that my name should be suggested, along with others, to head the mathematics component of the

new Office. It was at this time that my being a woman raised some serious doubts. But, in due course, I was invited to become head of the mathematics research program of ONR. I did raise a question about the possibility that my sex might prove a deterrent to my success. But we decided to take a chance.

My sex was only one of the problems that I had. I very much doubted that the mathematicians would want to receive support for their research from a military organization after the war was over. Initially, this judgment was right. But, as time passed, mathematicians found the program a very desirable one. And I found the ONR experience an exciting one. One activity that we supported was the newly established National Applied Mathematics Laboratory at the National Bureau of Standards which, as part of its program, brought distinguished foreign mathematicians to this country, sometimes as visitors, sometimes for longer stays. Olga Taussky Todd and Jack Todd were among those who came in those early post-war years. Now, of course, Olga Taussky is one of the American women making important contributions to mathematical research.

I spent 7 years in Washington until, in 1953, I left to return to Hunter as Dean. The experience in Washington had given me administrative and academic sophistication that would have been hard to get elsewhere. Partly to emphasize the character of the early program of ONR for those of you who may not have known it, I quote now from resolutions adopted by the Council of the American Mathematical Society after I had returned to Hunter:

> "Needless to say as the purest of all sciences, mathematical research might well have lagged behind [in the large-scale fostering by the U. S. government of fundamental research]. That nothing of the sort happened is beyond any doubt traceable to one person - Mina Rees. Under her guidance, basic research in general, and especially in mathematics, received the most intelligent and whole-hearted support. No greater wisdom and foresight could have been displayed and the whole postwar development of mathematical research in the United States owes an immeasurable debt to the poineer work of the Office of Naval Research and to the alert, vigorous and farsighted policy conducted by Miss Rees. The influence of these policies has been such that it vitally affected later developments: the activities of Air Force and Ordnance Research, the National Science Foundation itself."

I should also mention that the Institute of Mathematical Statistics adopted similar resolutions, and I include a brief excerpt:

> "Under Dr. Rees' leadership the Division of Mathematical Sciences of the Office of Naval Research gave whole-hearted support to basic research, in particular to basic research in mathematical statistics and probability. The whole action was conducted with remarkable foresight and wisdom...
> "...Mathematical Statistics owes Mina Rees a public 'well done'."

Among the many honors that I have received, I cherish most the three I received from mathematical groups: the two resolutions I have just cited, and the first Award for Distinguished Service to Mathematics conferred in January 1962 by the Mathematical Association.

For my future career, first at Hunter and later as a central administrator of the newly-established City University of New York, the importance of the ONR experience was in the rather intimate knowledge it gave me of the modus operandi and of the ambience of virtually all of the country's leading research universities and of many of the liberal arts colleges. It also resulted in the establishment of warm friendships with many mathematicians and with many university administrators.

My course was set. I was committed to administration, not research, but administration with a heavy orientation toward science. Invitations to serve on national committees continued to come. I was a member (and served as chairman) of the Advisory Committee on Mathematics of the National Bureau of Standards; of the Advisory Committee for Mathematics of NSF; of the General Sciences Advisory Board of DOD. I was a trustee of AMS from 1955-59, and a member of the NRC Mathematics Division from 1953-56, and of its executive committee for 2 years. For many years I served on the Board of Directors of AAAS, and was elected to its presidency for 1970, serving as chairman of its board the following year, the first woman to hold these posts. In 1958, at the suggestion of NSF, I called the meeting at MIT out of which grew the School Mathematics Study Group. In 1964, by presidential appointment, I became a member of the National Sciences Board.

My stay at Hunter lasted 8 years. In 1961 I was invited to develop the Ph.D. programs of the newly-established City University of New York. The University was based on the existing city colleges, including CUNY, Hunter, Brooklyn, Queens and Lehman, and resembled a British University with its many largely autonomous colleges more than a typical American university with one or two liberal arts colleges. I ended my career in 1972 as President of the Graduate School and University Center of the City University of New York.

The building of a graduate school that called upon and stimulated the growth of the scholarly and physical resources of so many established liberal arts colleges and that achieved acknowledged first-class graduate work in a brief period of time required the combining of traditional elements of academic structure with often difficult innovations. During this period, when my prime concern was with graduate education, I was active in the work of the Council of Graduate Schools in the United States, and was elected Chairman of that Council in 1970.

I believe it if fair to say that, in the Navy and while I was active in graduate education, I had some impact on the growing acceptance of women both in graduate education and in administrative and policy-making posts. In 1972, in a paper presented at a meeting of the American Council on Education, I reported that, at the City University, in contrast to the situation reported somewhat earlier at several other universities, there was strong evidence that women's performance as graduate students was about the same as that of men with respect to all three parameters that had been used to measure this performance in other studies reported in the literature: completion of the first or qualifying examination, completion of all requirements for the degree except the dissertation, and completion of the degree. Moreover, at our graduate school, women's admission to graduate study, access to fellowships, and acceptance on the faculty and in the administration seemed to be substantially without discrimination. On another front, I can report that, over the years, two other women have been appointed to head the Mathematics Branch in the Office of Naval Research and that one of these was also made Director of the Mathematical Sciences Division.

I have enjoyed and cherished my associations with mathematicians, but I have made no significant contributions to the corpus of mathematical work. When I was young my only ambition was to be a research mathematician. In retrospect, I don't believe that that was ever possible for me. But it is for some women. And it is clearly essential that we provide the opportunities for women as well as for men to find the satisfactions and the rewards of research careers if their talents and commitments make such careers possible. And other women are now showing the way.

NATIONAL COMMITTEE FOR RESPONSIVE PHILANTHROPY

press release

According to two reports issued today on foundation giving in Colorado and the San Francisco Bay Area, foundation money is not going to women, minorities, or public interest advocacy groups. The vast majority of foundation funding goes to long-established organizations engaged in traditional activities.

The reports, which were prepared by coalitions of "nontraditional" and social-change oriented organizations based in the two areas, also found that there is a "severe underrepresentation" of minorities and women on the boards of the foundations that were studied (only one of the 76 Colorado trustees and 20 of the 350 Bay Area trustees are minorities).

Robert Bothwell, executive director of the National Committee for Responsive Philanthropy, said that the two studies "document the contention that most foundations in all parts of the country have not responded to changing social needs." Bothwell cited three other recent studies of foundation giving (in Washington, D. C., Chicago, and the Southeast) which essentially reached the same conclusion. He also pointed out that studies done several years ago showed that most national foundations -- those that don't restrict their giving to one geographical area -- are similarly very traditional in what they support.

The problem with such giving, Bothwell explained, is that it prevents foundations from realizing the potential of the $2 billion they give away each year. "Because foundations are not subject to the constraints of the marketplace or the ballot box, they could fulfill roles that our other institutions simply cannot fulfill. They can try innovative approaches to social problems, they can support critical examinations of government and business, they can encourage efforts by minority groups to obtain their rights. But most foundations just keep funding the same institutions and the same types of projects year after year."

According to the report of the Colorado Committee for Responsive Philanthropy, only 2.7 percent of the $39 million given by that state's 25 largest foundations went to "nontraditional" recipients. Included in the definition of "nontraditional" were groups working with racial and ethnic minorities, women and the poor as well as groups advocating the rights of older Americans, youth, consumers, children and the environment.

The study done by the Bay Area Committee for Responsive Philanthropy, which covered 45 of 80 foundations in that area which annually make grants in excess of $80,000 (the other 35 would not allow anyone to be interviewed), also found that "most Bay Area foundations are not funding social-change oriented groups, are not funding innovation, and are not taking risks."

The California study, however, focused primarily on why such groups are excluded. The primary reason, according to the report, is that the people who run foundations are "overwhelmingly white, dominantly male, heavily populated with family members, business associates and friends of the original donor." Such people, the report explains, have far more social and business contacts with those involved with a hospital or museum rather than a free clinic or community arts group. Again this is a national problem with fewer than 1% of foundation trustees being black, 19% women and almost none from Hispanic, Asian, Native American, or other minority groups.

Both reports found that another reason foundations have little contact with non-traditional groups is that most of them provide little information about their funding priorities and about the processes they use to award grants. The majority of the larger foundations studied do not publish annual reports on their activities, which the San Francisco report said is the "absolute minimum needed for a foundation to understand and communicate its activities both to itself and the community at large." (Nationally, only 465 of the country's 26,000 foundations issue annual reports.)

Also, the San Francisco study found that many of the annual reports that are available do not provide basic information such as lists of the foundations' specific funding priorities and explanations of how the foundations make their decisions about grants.

Foundations have an obligation to be more accessible and accountable to the public, Bothwell argues, because of the "very considerable" tax benefits they receive from the public (their income is exempt from taxes; contributions to them are tax deductible). NCRP has organized a network of local coalitions to examine philanthropic institutions. Address: 1028 Connecticut Avenue, Suite 882, Washington, D. C. 20036.

OF POSSIBLE INTEREST

The Canadian Newsletter of Research on Women is an extensive resource listing, international in scope, of recent research reports, periodicals, and publications concerning women and sex roles. It is published in March, July and November; some issues consist of several hundred pages. Annual subscription rates are $7 in Canada, $8 in the U. S. and overseas, and $15 for institutions. Subscriptions are accepted on a calendar-year basis only. Write to: Department of Sociology, Ontario Institute for Studies in Education, 252 Bloor St. West, Toronto, Ontario, Canada M5S 1V6.

The National Council of Negro Women has recently established a National Archives for Black Women's History in Washington, D. C. People interested in women's history and the black experience can contact Bettye C. Thomas, The Mary Mcleod Bethune Historical Development Project, NCNW, 1318 Vermont Avenue, NW, Wash. D. C. 20005.

Constance Kenney and Holly Alderman are looking for pictures of women in all kinds of jobs for an album to be produced with Armitage Press. They have asked us for photographs of women mathematicians. Black and white or color are both acceptable. Write to Kenney & Alderman, 18 Brattle St., Cambridge, MA 02138 for a picture credit/release form. Photos will be returned on request.

DEADLINES: July 24 for Sept.-Oct., Sept. 24 for Nov.-Dec., Nov. 21 for Jan.-Feb.

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

JOB ADS

Institutional members of AWM receive two free ads per year. All other ads are $5.00 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.

University of Arizona. Asst. Professor and Statistician, Center for Quantitative Studies, College of Agriculture. 12 month position beginning July 1, 1979. Position involves general consulting with research faculty of Agricultural Experiment Station including traditional agricultural, natural resources, basic biology and social and economic research. The individual will teach approximately 3 credit hours each semester (Statistical Methods & Design & Analysis of Experiments). Submit resume and name of 3 references to Dr. Robert O. Kuehl, Director, Center for Quantitative Studies, 207 Biological Sciences East, University of Arizona, Tucson, AZ 85721. Closing date for applications is 6/15/79, or until position is filled.

College of Notre Dame. Dept. of Mathematics. Opening for Visiting Assistant Professor for 79/80. Prefer PhD in analysis, algebra or combinatorics with some computing experience including APL. 12 units teaching each semester. Duties begin 8/23/79. Apply to Jane M. Day, Mathematics Chair, College of Notre Dame, Belmont, CA 94002.

San Francisco State University. Dept. of Mathematics. Assistant Professor, tenure-track, starting Jan. or Sept., 1980. Require PhD or equivalent, and demonstrated competence in teaching and research. Teaching load of 12 hrs. per week. Salary $14,256 -$17,136. Send vita, bibliography and names of references to James T. Smith, Chairman, Mathematics Dept., San Francisco State University, 1600 Holloway Avenue, San Francisco, CA 94132.

Florida Atlantic University. Dept. of Mathematics. One year visiting assistant professor beginning Fall, 1979. PhD required plus demonstrated research ability. Ability to teach introductory Fortran programming is desirable. Applications and references should be sent to Tomas P. Schonbek, Chairman, Dept. of Mathematics, Florida Atlantic University, Boca Raton, Florida 33431.

Ohio State University. Dept. of Mathematics. Several lectureships beginning Autumn,1979. Though appointments are for 1 year, they will probably be extended for a second year. PhD and evidence of good teaching is expected of all applicants. Research potential and ability to profit from interaction with working groups in department will be factors in selecting appointees. Please send resumes and have letters of recommendation sent to Prof. D. K. Ray-Chaudhuri, Dept. of Mathematics, Ohio State University, 231 W. 18th Ave., Columbus, OH 43210.

Ohio State University. Dept. of Mathematics. Several visiting positions at various professional ranks beginning Autumn, 1979. PhD and research achievement compatible with rank under consideration are expected of all applicants. Appointees will be involved with instruction in our undergraduate and graduate programs. Please send resumes and have letters of recommendation sent to Prof. D. K. Ray-Chaudhuri, Ohio State University, Dept. of Mathematics, 231 W. 18th Ave., Columbus, OH 43210.

Chatham College. Dept. of Mathematics. Instructor or assistant professor, September, 1980, DA or PhD. Undergraduate teaching including applications of algebra and calculus to business and economics, linear algebra and intermediate analysis,statistics. Advising, independent studies, senior tutorials. 5 or 6 courses per year. Applications considered until 8/15/79. Please contact William A. Beck, Chairman, Dept. of Mathematics, Chatham College, Pittsburgh, PA 15232.

West Virginia University. Dept. of Mathematics. Opening for Chairman of Dept. of Mathematics available 9/1/80. PhD required plus established record of quality teaching and research; demonstrated leadership ability with administrative experience preferred. WVU has a firm commitment to developing its role as a major energy research center. Mathematics Dept. interacts with other units on campus including WVU Energy Research Center, Dept. of Statistics & Computer Science, College of Engineering and College of Mineral & Energy Resources. Send vita to Dr. C. J. Tompkins, Chmn of Search Committee, c/o College of Engineering, W. Virginia Univ., Morgantown, W.V. 26506 by 9/30/79.

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