File

Association for Women in Mathematics

Volume 9, Number 3 NEWSLETTER May-June 1979

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PRESIDENT'S REPORT

Duluth meeting. The AWM will meet at the August 1979 Joint Mathematics Meetings in Duluth. All of our activities are on Thursday, August 23. At 4 p.m. there will be a panel, "Math education: a feminist perspective." Speakers will include Diane Resek on elementary education, Lenore Blum on secondary and college education, and a speaker to be announced on adult education. At 5 p.m. there will be a business meeting. The main item on the agenda is the new by-laws, and everyone is urged to attend. At 8 p.m. that night we will reap our rewards at a wine and cheese party. Everyone is invited. As always, there will be an AWM table. Volunteers can sign up to staff it at the meeting, and everyone is welcome to come by and visit.

Honoring our own. Starting in January 1980 we will sponsor a one-hour lecture by a distinguished woman mathematician at every national AWM meeting. These lectures are tentatively titled the Emmy Noether Lectures, and the committee in charge is headed by Karen Uhlenbeck of the University of Illinois at Chicago Circle. We are looking for ways to fund these lectures. Any suggestions for funding or for speakers should be sent to Karen.

Elections. The AWM nominating committee consists of Alice Schafer (chair), Vera Pless, and Rebekka Struik. We need nominations for president-elect and three at-large executive committee members. Suggestions should be sent immediately to Alice at Wellesley College. (The immediately is because the deadline for the next newsletter is May 24, which is about the time this newsletter is expected to arrive in all of our mailboxes.) If your suggestions aren't in time to be considered by the nominating committee, or if you don't agree with their choice of nominees, just send me the names of your additional nominees so I can verify their willingness to run. Deadline for all nominations is the end of the Duluth meeting.

History. The University of Texas at Austin has started a collection of materials on the history of American mathematics. Copies of historical work or archival material on women in American mathematics should be sent to Albert C. Lewis, Humanities Research Center, The University of Texas at Austin.

Suing. The suit brought by the Association for Women in Science, along with six other organizations (including AWM) and ten individual plaintiffs against the National Institutes of Health was dismissed on the grounds that we failed to establish discrimination. Rather impolitely, it was dismissed in 1976 but our lawyers were not notified and only found out a couple of months ago.

Editorial. I was recently a speaker at a conference on math education which involved alot of people who were neither teachers nor mathematicians. This in itself is not such a bad idea. But the air was filled with anti-mathematical jokes, and many teachers introduced themselves with apologetic phrases ("I'm the person who probably made you hate math..."). We have to come out of our classrooms and away from our blackboards, folks, quit apologizing, and let our opinions be heard. Otherwise educational policy will be taken away from us.

Have a good summer and see you in Duluth.

Judy Roitman
Math Department
University of Kansas
Lawrence, KS 66045

LETTER TO THE EDITOR

I usually do not spend my time writing "letters to the editor", but the review of the Tobias book, Overcoming Math Anxiety, has provoked me enough to make this letter necessary. First of all, let me say that I have publicly and privately disagreed with Ms. Tobias' emphasis on anxiety. However, because I differ with someone does not mean that their views are any less valid than mine, or indeed that another person's emphasis will not be more effective in creating a better world for women. Ms. Tobias has made significant contributions to increasing women's participation in mathematics. She has addressed a problem not of women who have excelled in mathematics, but of women who have failed to learn mathematics. She is, and has been, on the cutting edge in recognition of the problem and serves as a catalyst for change. I firmly believe that without her contributions, my work and other's work in the field would not enjoy the favorable reception that it does.

Ms. Roitman makes many good points in her review, and both Ms. Tobias and myself could profit from more interaction with and knowledge of the community of women mathematicians. However, such communication must involve two sets of people who are willing and eager truly to communicate. Both sides must be willing to cooperate and, most of all, respect different ways of helping overcome the view commonly held of women and mathematics.

Sincerely submitted, Elizabeth Fennema, Associate Prof., Dept. of Curriculum and Instruction, School of Education, Univ. of Wisconsin, Madison.

AN OPEN LETTER TO THE MEMBERS OF AWM

The AWM Newsletter of March-April reported on two educational programs currently in action for the interests of young women: the Bay Area Math/Science Network in San Francisco and the national "Women and Mathematics" (WAM) sponsored by the MAA with support from IBM. The primary purpose of these programs is to encourage math/science pursuit among young women whom, it is believed, are generally being discouraged from such pursuit.

I believe we are making a subtle educational mistake in the support of such programs. This mistake has two primary factors. First, by concentrating only on the encouragement of women toward math/science, these programs serve to continue the rift between male and female scientists. The titles of several programs within the Bay Area Math/Science Network emphasize this: "Women in Science", "Math for Girls", "Expanding Your Horizons". These programs continue the idea that something is wrong with women in science, that females are different from males in mathematics. Where are the programs for "Math for Boys" and "Men in Science"? Why are the women always put on the defensive?

Which brings us to the second factor of the educational question: the myth that girls are being discouraged from math/science in the primary phases of education (grade and high school). I believe this popular notion (and excuse) of discouragement is a myth since I see no sign of it in my local educational system. I am involved in extensive tutoring, have had opportunities for conversation with students and counselors alike. For all practical purposes, the only students being discouraged from math/science curricula are the students who have either no aptitude for the work or no enduring interest. Those who demonstrate aptitude and interest are given opportunity for pursuit. This goes for both males and females. No distinction is being made, at least not here. I agree that distinctions are disasters; they only continue erecting myth upon myth.

I believe this idea of active gender discouragement supposedly going on in the schools should be researched and exploded. This simple equation, few women scientists = active female discouragement, is a good piece for blame and anger toward a faction other than ourselves. It may very well be a great fallacy instead. Also, as far as encouragement programs are concerned, if used at all they must be open to both males and females so that a balance of encouragement and opportunity may be maintained. A research program should be developed, the schools visited, and the students questioned as to whether or not real discouragement is going on on the educational level. If no active discouragement is happening, we must reassess our goals and reasoning. True assessment is needed first so that suitable programs may be developed for all students.

Sincerely, Catherine Folio, Middletown, N. J.

FACTORS RELATED TO YOUNG WOMEN"S MATH ACHIEVEMENT

from Caucus for Women in Statistics, Newsletter, Vol. 9, No. 1, Feb. 1979

Young women are not adequately prepared by most of the nation's high schools to take college courses that can lead to careers in mathematics and the physical sciences. And, contrary to popular opinion, "math anxiety" often is not the cause.

The fault, says Patricia Lund Casserly, a research scientist at Educational Testing Service (ETS), often rests with the customary attitudes and behaviors of parents, teachers, and guidance counselors toward females.

In the early high school years when most youngsters do not have definite career goals, she said, many girls are allowed to drop mathematics courses because of a false belief that math is not necessary in the social sciences, nursing and the humanities --career paths traditionally expected to be selected by girls.

"On the other hand, boys take mathematics all along since 'they'll probably need it' in the careers that they, their parents, friends and counselors assume they will have," Casserly said.

Without four or five years of high school mathematics and appropriate courses in chemistry and physics, few young women can be expected to pursue successfully college study in these areas and to seek related professional careers.

In a study supported by the National Science Foundation and the College Board, Casserly sought to identify those factors that encourage or discourage female participation in advanced high school science and mathematics programs. She examined the curriculum, guidance policies and student cultures at 13 high schools around the country, all of which have been successful in attracting and holding young women in strong, sustained programs in math, physics and chemistry. About 200 girls took part in the study.

The ETS researcher found no evidence to support the notion that math anxiety is more prevalent among girls than boys or that it prevents young women from committing themselves to mathematics-related fields. She said math anxiety is nothing more than "a popular slogan for educators and others to bandy about in professional circles and the media."

Casserly found three common characteristics of math teachers in schools with strong programs for women as well as men.

1. The teachers use older girls to counsel and tutor younger girls. "Young women can better relate to females in an advanced math course or to those who are several years ahead in high school or college," she said.

2. The teachers have access to their students' families. If a girl is having trouble or falling behind, the teachers can call parents directly to discuss what can be done.

3. Advanced Placement teachers, as a group, seem to thrive on teaching students, even female students, who may be brighter than they are themselves. This characteristic is crucial to the young women they teach. For, as a rule, Casserly said, gifted young women are not the delight to their teachers that young men are.

"If young ladies make waves, they're seen as aggressive or worse. Young men who suddenly demand challenging work are seen as finally settling down and getting serious about life and their future careers," she said.

Girls need more realistic counseling on the necessity of math backgrounds in a wide spectrum of college majors and careers, she said.

"We don't let students drop English because they have trouble spelling, or because their grammar is imperfect, or because they don't enjoy the selected literature," she said. "Let's not do it in mathematics either. There can be climate for mathematics as there is for English."

Talented and gifted children need challenging experiences in the schools, Casserly said. In some schools that took part in her first study, young girls with high mathematical abilities were identified as early as the elementary grades and placed in accelerated programs.

"Math can become a natural pursuit long before girls wonder whether it's a proper subject or before sexual self-consciousness and sexual stereotyping become problems," she said.

MAA AND REMEDIATION

We need your help--

The Mathematical Association of America's newly formed Committee on Improving Remediation in the Colleges is seeking information from universities and colleges about effective efforts in the area of mathematics remediation. The Committee especially solicits information about programs that have been shown to prepare students deficient in mathematics for successful performance in the mathematics courses required for degree programs. The Committee also welcomes information about experimental programs that show promise even though documentation of their success is not yet available. Course content, organization, and emphases as well as descriptions of curricular materials used are of particular interest.

In addition, the Committee wishes to identify programs that have been developed to correct directly the causes of inadequate student preparation in mathematics. Persons who can inform the Committee of such programs are asked to communicate with Professor Joan Leitzel, Dept. of Math., The Ohio State University, 231 West 18th Ave., Columbus, OH 43210.

SECOND CALL FOR AWIS REGISTRY

AWIS (Association for Women in Science) maintains a registry of women in science and engineering which is used both to generate lists for prospective employers and to provide names for consultantships and advisory panels. One of the most crucial professions in which they still do not have enough names is mathematics. For information, write AWIS, 1346 Connecticut Ave., N.W., Suite 1122, Washington, D.C. 20036 or call Judith A. Rameley, president of AWIS, at 402-541-4203.

WOMEN IN MATHEMATICS IN AUSTRALIA

by Dr. Jennifer Seberry, Senior Lecturer, Applied Mathematics Department,
The University of Sydney, N.S.W. 2006 Australia
presented to the 1978 Australasian Mathematical Convention, Christchurch, N.Z. reprinted by permission of the author.

Foreword: For readers unfamiliar with the Australian system

In Australia, normally a person graduating in mathematics from a university would have studied for three years, obtaining a Bachelor of Science or a Bachelor of Arts degree, although there are other possibilities.

A typical Bachelor of Science degree might comprise

First Year: Mathematics I; Physics I; Chemistry I; another science, e.g., Biology I, Geology I, Psychology I

Second Year: Pure Mathematics II, and two of Applied Mathematics II, Statistics II, another science

Third Year: Pure Mathematics III, and one of Applied Mathematics III, Statistics III.

Again there are a number of variations possible.

In many universities, including the University of Sydney, a better student will take a more demanding and extensive programme from the first year onwards doing up to a third more work in each subject. These are called honours courses.

The grades awarded are High Distinction (HD), Distinction (D), Credit (Cr), Pass (P). A student can obtain only HD or D grades in the honours courses. Furthermore a grade of Cr or better is required to proceed to honours in a higher year.

It is not uncommon for Second Year Honours Applied Mathematics to have two or fewer women students; that is, less than 4%.

After three years a student with sufficiently high grades in honours courses may elect to do an extra year of course work and obtain a Bachelor of Science (Honours) degree. These students cannot obtain a Bachelor of Science degree as well. Bachelor of Science (Honours) degrees are a prerequisite for proceeding to a Masters or Ph.D. and include much of the course work expected of U.S. or Canadian graduate students. They are awarded as either Honours Class I, Honours Class II (Division I), Honours Class II (Division II), Honours Class III.

Many universities will permit only students with Honours Class II (Division I) or Honours Class I to proceed to higher degrees.

It is almost impossible to obtain a scholarship for postgraduate study without Honours Class I.

Note: The academic ranks in Australia and their U.S./Canada equivalent:

Professor	(Full) Professor
Reader/Associate Professor	
Senior Lecturer	Associate Professor
Lecturer	Assistant Professor
Senior Tutor	Instructor
Tutor	

HONOURS DEGREES (the number in brackets are First Class Honours)

Year	1976	1975	1974	1973	1972	1971	1970	1969	1968
Men	114(51)	120(55)	141(46)	134(51)	127	142	103	127	127
Women	27(10)	26(15)	42(21)	26(7)	21	35	12	16	7
Total	141(61)	146(70)	183(67)	160(58)	148	177	115	143	134
% Women in total	19.1(16.4)	17.8(21.4)	23.0(31.3)	16.3(12.1)	14.2	19.8	10.4	11.2	5.2

Table 1: Honours Degrees

1967	1966	1965	1959-64	Total
101	94	77	283	1690
15	16	13	33	289
116	110	90	316	1979
12.9	14.5	14.4	10.4	14.6

Table 2: Masters Degrees

Year	1974	1973	1972	1959-71	Total
Men	18	15	23	237	293
Women	4	3	2	23	43
Total	22	18	25	271	336
% Women in Total	18.2	16.7	8.0	12.5	12.8

Table 3: Ph.D. Degrees

Year	1974	1973	1972	1959-71	Total
Men	38	44	28	225	335
Women	4	1	5	10	20
Total	42	45	33	235	355
% Women in Total	9.5	2.2	15.2	4.3	5.6

Table 4: Higher Degrees

Year	1974	1973	1972	1959-71	Total
Men	56	59	51	462	628
Women	8	4	7	44	63
Total	64	63	58	506	691
% Women in Total	12.5	6.3	12.1	8.7	9.1

Text of paper:

Many people believe women cannot "do" mathematics. This is not ture; Tables 1,2 and 3 show us that some women are quite good at mathematics. Also Table 1 (which shows Honours degrees) clearly indicates that in recent years the percentage of women obtaining Honours degrees has steadily increased. I attribute this increase to the consciousness raising due to changing community attitudes to women. It is no longer unfashionable for women to obtain a mathematical education with a view to having a career.

The data in Tables 2 and 3 is not up-to-date. It can be interpreted as indicating the "fear of success syndrome" in women. This syndrome is supposed to have been caused by women fearing they will be less marriageable or become intellectual freaks if they are clever and highly educated. It can also be viewed as reflecting the discrimination

against women in obtaining scholarships to study for higher degrees and the commonly held view that it is much more difficult for a woman to obtain a tenured academic position.

When we consider the number of women obtaining Honours degrees and how few obtai Ph.D.'s we must ask "Are Honours degrees a good indication of research potential?" I the answer is yes, then we must ask "Why are we not obtaining women Ph.D.'s?" If the answer is not, then we must ask "What is wrong with our system of awarding Honours?"

Many (male) mathematicians have observed that female students tend to sit at the front of the class, diligently take copious notes and then learn them parrot fashion. They say the women display relatively little initiative or creativity. In other word they feel that if a woman acts in a socially acceptable feminine way it proves she ha no innate ability.

My view is that young women spend so much time and psychic energy submerging the natural selves in order to appear acceptable and feminine (and not a threat to their male teachers) that they suppress their innate creativity.

The woman example

Time and time again in social contexts I have met primary school teachers who admit they cannot "do decimals", "do percentages" or "do fractions". As so much of a primary school teacher's time is involved teaching fundamental, basic, important mathematics this is frightening.

It appears that it is women who do not like mathematics who choose to become primary school teachers. During teacher training these women study a course in Mathematics Method but it is assumed they actually know primary school mathematics.

I believe many people's difficulties with mathematics stem from primary school a perhaps from teachers who did not like or understand their subject matter. These pec go on to become primary school teachers and the cycle is repeated.

So the example in the community at large is of women not being at ease with mathematics. It is not counteracted in high school, few women are Subject Masters, nor in University; in Australia there are no women Professors of Mathematics.

Source of statistics: several articles by J. B. Douglas in the Australian Mathematic Society Gazette; 1(2), 1974, 59-60; 2(3), 1975, 89-90; 3(1), 1976, 20-25; 4(1), 1977, 28-30; 4(3), 1977, 86-87.

ON CAMPUS WITH WOMEN

reprinted from On Campus With Women, publication of the Project on the Status and Education of Women, Association of American Colleges, 1818 R Street, N.W., Wash., D.C. 20009.

Supreme Court Rules "Proof" of Nondiscriminatory Intent Unnecessary

The U.S. Supreme Court recently ruled that a federal appeals court had applied too harsh a standard in determining that Keene State College (N.H.) discriminated against women in faculty promotions (Keene State College v. Sweeney, Docket No. 77-17 438 U.S.). Four of the nine justices, however, dissented and said that the lower cou requirement that the college "prove absence of discriminatory motive" in rebutting a prima facie showing of discrimination. The majority said that under the court's deci in Furnco Construction Co. v. Waters (46 U.S.L.W. 4966, 438 U.S.) an employer need on "articulate" but not "prove" some "legitimate non-discriminatory reason" for the alle discriminatory actions. The court remanded Sweeney to the First Circuit Court of App for reconsideration under the Furnco guidelines. The dissenting Justices Stevens, Brennan, Stewart and Marshall, however, said the majority created a "false distinction drawn for the first time in this case" between proving non-discrimination an articulating a non-discriminatory motive for questionable hiring or promotion decisio

Christine Sweeney, since 1969 a faculty member at Keene State College in New Hampshire, charged that twice she had been denied promotion to a full professorship on the basis of her sex. Sweeney eventually did receive the promotion in 1976, while her attempts had begun in 1972. The U.S. District Court for the District of New Hampshire, in a decision relying heavily on statistics and upheld by the First Circuit Court of Appeals, had ruled that she had been the victim of sex discrimination in her second attempt to gain promotion in 1975. It ordered that her promotion be backdated, and awarded her backpay for the lost salary increase, as well as attorney's fees.

In a similar case, Powell V. Syracuse University (47 U.S.L.W. 2094, 438 U.S.), the Supreme Court let stand a Second U.S. Circuit Court of Appeals decision that fired art instructor Geraldine Powell was not a victim of sex or race discrimination. The lower court had held that the university rebutted Powell's prima facie case when a majority of its faculty review panel testified they did not vote against her on the basis of her sex or race.

Faculty Women Still Less than Equal

Women were outnumbered and out-earned by men at all college faculty levels in 1977-78, according to statistics recently reported by the National Center for Educational Statistics (NCES). A full-time woman faculty member earned an average of $17,604 last uear while her male colleagues earned $23,447. A similar situation existed for professors working under nine-month contracts with the men earning an average of $19,488 and the women averaging only $16,134. Women consistently fell behind men in salaries for both nine-and 12-month faculty contracts at all levels. NCES also reported that of the total 389,033 faculty positions studied, men held almost 75 percent or 290,244 of the jobs.

You've Come A Long Way, Maybe???

Women and minorities continue to be afflicted by serious problems of inequality with regard to majority males, according to a recent report issued by the U.S. Commission on Civil Rights. The 136-page report, Social Indicators of Equality for Minorities and Women, compares statistics for women and minority men with those for non-minority men in terms of housing, jobs, income, and education. Among its major findings:

* College educated women of all races earned less than minority and white males with comparable educational attainment. For instance, none of the college educated female groups averaged earnings as much as 70 percent of the majority male average in 1976.
* The percentage of the labor force that is out of work and actively seeking work is generally much higher for minority people of both sexes and for majority females than for majority males.
* The average occupational prestige of jobs held by most minorities and women was much lower than for majority males. Some slight relative improvement occurred during the early 1970's for minority males, but there were slight declines for some of the female groups.
* For the same job, or for jobs with similar skill or educational requirements, (such as positions requiring a college degree), minorities and women must demonstrate greater skill or more educational accomplishments than majority males. Where this type of discrimination exists, minorities and women must be educationally over-qualified in order to obtain employment or promotions. Over-qualification is more prevalent among women and minority males than majority males.
* The low income ratios for women and minorities imply that members of one group get fewer opportunities to produce up to their potential or that they are not as well rewarded for equal levels of achievement.

Available free from the U.S. Commission on Civil Rights, Federal Evaluation Unit, Room 606; 1121 Vermont, NW, Wash., D.C. 20425.

New Index to Information on Women

The Bureau of Labor Statistics (BLS) of the Dept. of Labor has issued an information index to its extensive collection of data on working women. Entitled Where to Find BLS Statistics on Women, this 10-page pamphlet summarizes statistics on women which are available from the BLS library of publications (including press releases, periodicals, bulletins, and reports) and indicates where they may be found. Instructions on how to obtain the data are given at the back of the pamphlet.

Women on Campus Gaining Strength in Numbers

Again this year, more students are women. The number of women college students in Fall 1978 jumped 1.6 percent to 5.7 million, up from 5.6 million, according to preliminary statistics recently released by the National Center for Educational Statistics (NCES). At the same time, the number of men enrolled in college dropped 2.6 percent. Part-time female enrollment showed an increase of 5.5 percent to 2.5 million, but the number of full-time women students declined 1.2 percent this year to 3.16 million. For men students, full-time enrollment dropped even more: 4.4 percent to 3.5 million this year; part-time male enrollment increased only .5 percent to 2.2 million.

SURVIVAL OF THE FITTEST #?

by Everywoman, Ph.D.

At every office, restaurant, service station, library, concert, bar, dentist, restroom, store, I hear "Hello, Dr. Everywoman!" [This is what community college means.] And, during the second week in Basic Math (arithmetic): "Dr. Everywoman! I finally figured out who you are; I've seen you at the Deli where I work often, but HERE you look ...different...". Then a man student: "Aren't you Dr. Youngprofessor's wife over at Emerging University? Why do they call you Dr. 'Everywoman' HERE?".

On my way upstairs I pass Dean Academics. "Oh, Dr. Otherwoman," he says. [I have been on campus 4 years. Dr. Otherwoman, the only other woman Ph.D. in my department, 5 years.] On my hall I find a student. "I'm looking for my teacher, Dr. Everywoman." Puzzled that I never saw him, I identify myself. "Oh, I'm sorry. I guess it's Otherwoman that I want." [At least Otherwoman and I finally have private offices this year.]

On the subject of offices: a favorite colleague told me just the other day that before I arrived, he asked to share an office with me; he was told it wouldn't be suitable HERE. [Because I am Everywoman...or because he is black?]

After several puzzling years, I'm starting to figure 'HERE' out:

[Meetings] Oh, I know you're enthusiastic about the mathematics, but what will you bring back from Providence that we can use HERE?

[Competence] I only trust My Pet to teach MATH XXX; he cares so much about the students HERE. [He's a former student HERE.]

[Research] I'm surprised you haven't published any since last year's evaluation, Everywoman. Why, you know My Pet just got another accepted at the Educator's Journal. Of course I know you're working on something, but we wouldn't understand it HERE.

[Tenure] I have been delighted with your work, but I'm not recommending you for tenure yet because I want to observe you another year; when you first came HERE I doubted you were temperamentally suited to teaching HERE. [Just-Tenured Joan, "held over" last year in another department, advises me "Be popular with students and always cover your ----. Get pregnant, Everywoman, or at least play your family up; it makes you less frightening HERE."]

[on the AMS] Of course I belong to the MAS, but I don't understand a thing that's in the Monthly.

Well, it's summer so I can work today at the E.U. library. [I have to pretend to be my husband's graduate student because E.U. doesn't extend courtesy privileges to community college faculty.] And at least the men [40 men; no women] in my husband's department are cordial to me. [Just the other day, one told me that my typing my husband's papers is good for both of us.] You say that sort of comment isn't winning? Well it sure beats when the now-retired math department chairman at E. U. was told by one of his senior faculty that I was writing an elementary text in "Foundations." "Foundations of what--Education?", he responded.

We've come a long way? Well, at least this year I got tenure.

DATA ON WOMEN IN SCIENTIFIC RESEARCH: Part 6 of 6

by Betty M. Vetter, Executive Director, Scientific Manpower Commission

MINORITY WOMEN

Black, American Indian and Asian women are 7% of all women doctorates who identified this characteristic, according to data for 1975 produced by the National Research Council for NSF. Within the total of 26,118 doctorate women scientists and engineers, NSF says there are 444 black women, 44 American Indians, 1,234 Asians and 23,062 whites. An additional 1,311 doctoral women did not report their racial or ethnic origin for the 1975 survey.[1]

There is no statistical information available on minority women doctorates by primary activity, so we do not know whether they are more or less likely to be working in research than are all women doctorate scientists and engineers.

CHANGES OVER TIME

The number of women choosing to prepare themselves for careers in science and engineering has been increasing rapidly since the 1950's, but women still constitute less than 10% of all doctoral scientists and engineers in the labor force (Table 5), and their proportion of earned doctorates in the sciences in the first half of the 1970's (13%) is barely above their 12.3% share in the 1920's (Table 9). Although the actual number of women earning doctorates in the sciences and engineering has increased in every decade of this century, the growth in doctorates for men far surpassed the growth for women, particularly in the decade following World War II. Their proportion is highest among psychologists and lowest among engineers at the doctoral level, and the proportion choosing the social, behavioral and life sciences over the physical sciences and engineering has not altered substantially in fifty years. However, a real change is occurring at the bachelor's level in engineering, where the increase in the number of women freshmen has risen an astonishing 623% from 1969 to 1976. This increase is not yet fully reflected in bachelor's degrees, but the number of women among new baccalaureate engineers has increased 509% in that same time period, from 328 in 1968-69 to 1,376 in 1975-76, and their proportion of the graduates has risen from 0.8% to 3.6%.[2] This increase in expected to continue, at least over the next few years.

Nonetheless, the proportion of women among science and engineering researchers remains small (Table 2 and 5).

SUMMARY AND RECOMMENDATIONS

1. Among 148,500 scientists and engineers who list basic or applied research as their primary activity in 1974, only 15,400 (10.4%) are women. Among 72,900 doctoral scientists and engineers working principally in basic or applied research in 1975, 5,818 (7.3%) are women.

2. Among all scientists and engineers in 1974, women are more likely than men to work in basic research (8.2% of women and 3.2% of men) and in applied research (7.8% of women and 5.3% of men). However, among science and engineering doctorates in 1975, 20.6% of women and 14.8% of men were working principally in basic research while 6.1% of women and 13.8% of men were doing applied research.

3. Women are much less likely than men to work principally in development, and only half as likely as men to engage in the management of R&D. Within the total R&D effort in 1974, 23,500 women made up 5% of the 470,700 scientists and engineers so engaged. Among the 84,510 doctorates engaged in R&D in 1975, the 6,042 women were 7.1% of the total, and were 11.5% of these working in basic research but were only 3.9% of those in applied research, 1.9% of those working in development and 2.5% of those engaged in the management of R&D.

4. The number and proportion of women earning degrees in science and engineering has increased rapidly during the 1970's, although women's proportions of doctorates in these fields in the 1970's (13%) is only slightly above their proportion of earned doctorates in these fields in the 1920's (12.3%). The proportion of women scientists and engineers employed in academic settings and in industry also has increased, but more slowly than their share of earned degrees. Their proportion of the science and engineering work force as well as their proportion of research manpower remains below 10%.

5. Women doctoral scientists and engineers are more likely to work in academic institutions and less likely to work in business and industry than are men.

A. Among all doctoral scientists and engineers, 58.8% are employed in educational institutions whereas 70.3% of women are employed in this setting. Proportionately more women scientists and engineers than men are employed full-time in universities, and the higher the level of research expenditure or employment of scientists and engineers in these institutions, the higher the proportion of women within the full-time science and engineering work force. Insufficient data are available to ascertain the important demographics of these women (degree level, salary, principal work activity, academic rank, if any) that might explain this trend toward a higher proportion of women employed in the most research-oriented universities than in all universities. Is the employment of women scientists and engineers markedly different from the employment of women in other fields at academic institutions, or are more women employed as research assistants, outside of regular faculty tracks, at these institutions? While it is true that the proportion of women among full-time scientists and engineers is higher at the most research-oriented universities than at universities which employ fewer scientists and engineers, it is also true that the proportion of women among scientists and engineers employed in universities is smaller than their proportion in two-year institutions, as is also true for women as a proportion of all faculty in educational institutions. In 1976, women were 14.9% of full-time scientists and engineers employed at doctorate granting institutions but 20.4% of those employed at two-year institutions.

B. Among all doctoral scientists and engineers, 23% are employed in industry, but only 9.6% of all doctoral women scientists and engineers are so employed. Available data do not allow analysis of women's primary work activity in the employment setting to know whether a greater or smaller proportion of this segment of women are working in research than either the proportion of men scientists and engineers in this employment setting or than the proportion of all women scientists and engineers who are working in research. In any case, the number of women researchers in industry is small.

C. Among women doctoral scientists and engineers, 4.7% are employed in federal government compared to 8.3% of all doctoral scientists and engineers, but no data are available to delineate the women working in research from those working at other activities within the government. The existing data indicate only that women scientists and engineers hold lower rank and draw lesser salaries than comparable men in the Civil Service, and that their opportunities for advancement are markedly less than for men at the same degree level.

6. Limited data on the labor force participation of women scientists and engineers seems at variance with available data on labor force participation of all women with similar amounts of education. Better data are required both to understand the actual participation of women trained in science and engineering and the reasons why those women out of the labor force are not at work or seeking work. Among doctoral women scientists and engineers, only 5.1% of those not retired were out of the labor force in 1975.

7. The unemployment rates of doctoral women scientists and engineers are three times higher than for men in every field of science, and are five times higher among young doctorates in the 30 to 34 age group.

8. No data are available to show any differences that may exist between minority and majority women scientists and engineers in terms of their primary work activity or their employment setting. Minority women constitute about 7% of all women doctorates in 1975, with Asian women making up 5% of all doctoral women scientists and engineers, black women 1.8% and American Indian women less than two-tenths of one percent.

9. Women scientists and engineers earn less than men in every field, at every degree level, at every level of experience, and in every employment setting. The salary gap is increasing rather than decreasing.

10. Available data are inadequate to examine in any detail the characteristics of women scientists and engineers who are performing research. Surveys that are used to obtain much of the available data are samples of populations and include too few women to allow delineation of those characteristics which would show any significant differences between men and women performing research; or between women scientists and engineers working in research and those engaged in other activities. Further, where surveys of total populations are made, rather than using samples, the survey instruments do not request the information needed to separate by sex and cross tabulate for such characteristics as degree level or principal work activity. No current data are available on academic rank by field and sex, to say nothing of such refinements as by type and size of institution.

In populations such as scientists and engineers, where women are only a small proportion of the total workers, samples selected for surveys must be constituted by oversampling of women relative to men if any meaningful detailed data by sex are to be obtained. Further, and particularly where the population being surveyed is a 100% sample, additional questions are needed in the survey instrument and further analysis of the resultant data is prerequisite to obtaining real understanding of such characteristics as the labor force participation of women relative to men and of their activities in the scientific enterprise within each of the major employment settings. Only when such data are available can we determine in what ways women are treated or act differently than men; which differences may reflect a choice by women; and what efforts to include more women in segment of science and engineering are liekly to be most fruitful and valuable both to science and to scientists.

Notes

1. NSF, Characteristics of Doctoral Scientists and Engineers in the United States, 1975, NSF 77-309, p.116.
2. Scientific Manpower Commission, Professional Women and Minorities, A Manpower Data Resource Service, May 1975 and supplements February 1976, October 1976 and July 1977.

Other sources

Commission on Human Resources, National Academy of Sciences

Employment Status of Ph.D. Scientists and Engineers, 1973 and 1975, 1976
Summary Report 1974 Doctorate Recipients from United States Universities, 1975.
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Federal Support to Universities, Colleges and Selected Non-Profit Institutions, Fiscal Year 1975, NSF 77-311.
Manpower Resources for Scientific Activities at Universities and Colleges, January 1976, Detailed Statistical Tables, Appendix B, NSF 76-321.

WOMEN IN ACADEMIC CHEMISTRY FIND RISE TO FULL STATUS DIFFICULT: Part 2 of 2

by Rebecca L. Rawls and Jeffrey L. Fox, C&EN Washington
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Another frustration that women in chemistry departments face, particularly more established women, is called fondly the "committee energy siphon." Universities hatch committees prolifically, and they like them to be staffed with representative samples of their faculty. Thus, when there are so few women on a faculty overall, committee assignments fall very heavily on the women who are there. "When a woman joins this institution," says one established chemist, "she's asked to sit on every goddam committee that meets. She has to learn to set her priorities."

And committee assignments can extend beyond the university. "Women like me are old enough to have some status and stability," explains Dr. Mary L. Good, professor of chemistry at the University of New Orleans. "We are the visible people, and we are asked to serve on all sorts of things--NSF panels, NIH review boards. But the number of us available to do these things is not really large."

The obstacle course for women chemists in universities, if formidable, is not impassable. Several young women are succeeding in academic institutions and making it through the tenure process. Several of them are quick to attribute much of their success to their department's support of them. For example, Dr. Joan S. Valentine, associate professor at Douglass College of Rutgers University in New Brunswick, N. J., says that such support was "key for me. The older faculty were supportive of all the young faculty, but particularly the women." Indeed, Rutgers appears to be a particularly congenial place for women, with six on its graduate faculty of 40. This is twice as many women as were found at any other institution in Green's survey.

Another Rutgers chemist, Dr. Martha A. Cotter, says, "I'm not sure there's anything unique about this department, (but) it's very human." And, she adds, the department makes sure that she has access to unlimited computer time, crucial for doing her calculations in theoretical chemistry.

The women in the chemistry faculty at Rutgers clearly have an influence on women doing bachelor's degree work there. One graduate notes that having women chemistry professors "removed any doubt from my mind that a chemistry career was possible. It made it look normal for a woman."

"Women's colleges have made a tremendous contribution to women in science," agrees Mt. Holyoke's Harrison. The feeling at these schools is that "science is good for women and women are good for science. That's very different from women just being tolerated in science." Graduates are surprised by the negative attitudes toward women in science that they sometimes encounter when they leave women's colleges, but "they can cope," Harrison adds.

"Douglass did it," says a recent graduate of that school. "I can remember when Joan Valentine was pregnant, she just had to stand farther and farther from the blackboard each day," she says. "That convinced me there's no reason you can't combine a career and family. That's what you see at Douglass, and what you expect. Just normal people."

That view is not widely held yet, however. As one department chairman puts it, "Many women subordinate their careers to their husband's because they want to lead a 'normal' life." Another adds, "A woman's traditional role as the central figure in the family seems incompatible with the demands of a 70-hour workweek imposed by an academic career." A faculty member at Princeton University is more explicit: "There's a barrier if a woman is married. A marriage and a career are going to conflict. Young faculty work very hard to survive, and I don't think that most women can think of devoting their lives to that."

For some women, family constraints can pose real problems in their first academic job. Probably the first difficulty to come up is that of job mobility. Traditionally a woman has tied her career to her husband's, and many still do. This can force her to consider jobs only within a highly restricted geographic area. Several chairmen of top chemistry departments say they have made job offers to what they consider outstanding young women and were turned down because the women's husbands were employed in a different geographic location.

Even single women may be less geographically mobile than young men are. Dr. Jean'ne M. Shreeve, chairman of the chemistry department at the University of Idaho,

says she frequently tries to encourage young women chemists to apply for positions in her department, only to find them uninterested in leaving the urban centers of the East. "I don't have much sympathy for them," Shreeve says. "I like living in Idaho, but if it meant the difference between having a job and not having one, I would go East, at least for a while."

The problem of finding two jobs in one locality has led some universities to set aside nepotism rules. Some couples in which both husband and wife are chemists have been hired recently by departments. And in urban areas and research centers, the availability of several institutions can ease the pinch. But the problem is far from solved. One chemist at Douglass advises her students to "marry someone with a mobile career." The alternative for some couples is to maintain careers in separate cities. But acceptability of that approach for many couples is dubious.

The question of having children is a difficult one for young women in academic chemistry. Some women--and these are extreme cases--elect not to conduct experiments during a pregnancy, saying that exposing a developing fetus to potentially dangerous chemicals isn't worth the risk. Meanwhile, for such women, the tenure clock runs on. Particularly for women in synthetic chemistry or for those who do not have graduate students working with them, such time away from the lab bench might have a dire effect on their tenure chances.

The problem is very real and not very easy to solve. Occasionally, part-time faculty appointments are feasible, but they are relatively rare. And, as several people have noted, "half-time" appointments tend to creep up to three-quarter time. "In the meantime," one woman chemist says, "the full-time faculty can acquire limited lab space or other such amenities. Half-time people tend to be passed over, leaving them without space. Not having a lab is a real liability for an experimenter."

There's no unanimity among women chemists on the topic of balancing children and a career. Valentine, who is raising two small children, says that she has been lucky with them and that her department has been generous to her. "They just assumed I would continue," she says. "I wouldn't have been willing not to have children," she adds. "No job is that important."

But many women in similar job situations reach the opposite conclusion. "Raising children would have been a horrible impediment to me," says one. "I had no trouble making the decision not to have them." Another woman is more emphatic: "I see no way on earth that I could successfully have a family at this point; it would be asking too much of myself."

Even if time and work are forfeited when a woman has children, many people object to that gap being used to judge her professional ability. "It doesn't make sense to say a scientist is obsolete if she takes out two to three years to raise a family," says Dr. Dudley R. Herschbach, chairman of the chemistry department at Harvard University. "She started out as a graduate student, completely wet behind the ears, and worked up to doing research at the frontiers of science by the time she published her thesis, say five years later. You can't tell me she can't do it again." Present academic structures are often too inflexible to accommodate "irregularities." However, in wartime, accommodations are made for interrupted careers, several chemists note. They question whether this problem of an interrupted career, if seriously considered, could not be resolved.

It's difficult to draw wisdom from the experiences of many older women chemists. To some extent, they probably faced a tradition that has been overturned, or at least has rapidly eroded in the past few years. To find academic work, for instance, women traditionally stayed with nontenure-track positions. Ramey refers to the extended postdoctoral-research associate positions as "the real ghetto for women." Because such appointments are more plentiful and more flexible, they make coordinating two careers appear easier in the short run. "The women get stuck," Ramey says. "Often they are in the best schools, and they do valuable work." But they have no job security and can be dropped when the grants run out. "By their late 30's, such women become hard to place in other positions," she adds.

Another place in academic chemistry that has been more consistently open to women is teaching. Even many of the prestigious chemistry departments--the ones that have

only recently sought women for their tenure-track faculty--traditionally have employed women in lectureship or instructor positions. For some women, such positions have offered greater flexibility, but poorer chances for advancement, than tenure-track jobs. Women may consider this an advantage when their children are young. "The trouble is, there are very few connections between these 'off-ladder' positions and the tenure ladder," Herschbach of Harvard says. "So when women want to come back, they have a hard time. Departments still look for the young, new, hardworking chemist," he adds. "It's looser now, but not loose enough.

Frustrating though these nontenure-track positions might be for the women in them, these teachers are very influential on young women considering chemistry careers. One young scientist describes her chemistry professor of more than a decade ago as "an intellectual meteor--she made our careers possible." But this scientist notes that her former teacher was never given "full status."

The notion that women need "role models" in chemistry pervades the ranks of women chemists and also is frequently mentioned by department chairmen. The term refers to a senior and successful chemist whom one sees as worthy of emulation. "Having a role model present makes success respectable for a woman," says one scientist.

The most effective role models are women who are full-fledged members of chemistry departments, especially the particular departments young women chemists are associated with themselves. Some of their influence may be subtle. Dr. Betty Vetter of the Scientific Manpower Commission argues, for example, that male faculty members might need female models, too. "The lack of women in chemistry departments not only affects (the student's) perspective," Vetter says, "it affects the way men in the department treat you. They treat women students differently when they have women colleagues on the faculty."

What, then, is happening to the "young, new, hardworking" women chemists? Are they being snapped up by the front rank of chemistry departments? Judging from the numbers of them added to faculty lists in the past several years, the answer is, only in part. The increase is a blip in the statistics, not a surge, and it is difficult to determine why that's so.

At the graduate level, things are looking up. "I'm not conscious of being a woman in science, just a graduate student in chemistry," one woman close to finishing her Ph.D. says. Her worry right now is the hint that she might have a better chance for some jobs because she's a woman. "Iwant to be judged by the same standards as everyone else," she says.

To hear department chairmen tell it, her worries may be justified. There is "a much more open attitude on the part of senior faculty toward women," says one department chairman. "If a good woman candidate comes along, she now has at least an even chance with a man for getting the position. If it's a dead heat, she might have a better chance because, let's face it, the men feel a little guilty about having kept them out." Says another chairman, "Our university criticizes our department for not having a single woman member. We would love to see qualified women applicants who are clearly superior to male candidates in the areas of interest to us." But, he adds, "We will never take a woman when there are other more qualified candidates."

Some observers suggest that it may be too early to see large numbers of women getting on chemistry faculties. The big increases in women earning doctorates are coming right now, they argue, and their impact at the entry level of university positions is a few years off. "Looking eight to 10 years ahead, we'll see many well-qualified women taking faculty positions," says Dr. Harry B. Gray, chemistry chairman at California Institute of Technology. "We need many more qualified women in the pipeline before we see a major impact," he adds.

Others agree, Placing women on chemistry faculties "turns out in many ways to be a probability game," says New Orleans' Good. "A fair amount of it certainly is not overt discrimination; it's a matter of statistics." Other prominent women chemists, such as Dr. Marjorie C. Caserio at the University of California, Irvine, share that view.

Indeed, most departments contacted say they are "beating the bushes" for qualified women applicants, and that the reason more women are not being hired is that they are not applying for academic positions. Women may be getting 12% of the Ph.D.'s in chemistry, but they make up only about 5% of the applicants for faculty positions at Harvard,

according to Herschbach. They also receive about 5% of the job offers, he adds. Dr. Joseph Cerny, chemistry chairman at the University of California, Berkeley, says his department has made three job offers at the assistant professor level to women in the past five years, which is about one third of all the offers they have made at this level. "We rarely get an application from a woman," agrees Shreeve of Idaho.

"If I knew some special way to get qualified women to apply," another chairman says, "I could be chairman anywhere."

What happens to the women, then, the ones who are being graduated from the top-notch departments, who, presumably, should be prominent candidates for faculty positions? Surprisingly, no one seems to know. The numbers that are available are scanty, but they seem to show that women follow about the same career paths as men.

At MIT, for example, 10% of the 224 chemistry Ph.D.'s over the past five years went to women, according to department chairman Kinsey. Seven of these women took jobs in industry, five at universities or colleges. Their male cohorts followed similar paths, in greater numbers but equivalent percentages. "The picture is nearly identical for men and women," Kinsey concludes. But that cannot be said with certainty about the many women who do postdoctoral work. The responsibility for promoting their careers doesn't rest clearly with any particular mentor. The thesis advisor may retain interest, although his influence wanes. Meanwhile the current mentor has his or her own graduate students to place. It's impossible to determine how often this happens.

The lack of an effective sponsor at this stage in their careers is often cited as a reason why more women don't apply for faculty positions. "It's very subtle," one woman chemist says. "Faculty members don't encourage their postdocs to apply for prestigious jobs." Self-image is important here, and it seems to need bolstering when it comes to writing job applications. "The problem is self-image," one department chairman says. "It starts before women get to graduate school; they lack self-confidence. Another chiairman says, "The women Ph.D.'s here that I thought extraordinarily qualified have not been interested in pursuing prestigiuous academic careers. But many men also are less enthusiastic now."

"A lot of people, particularly women, don't have sufficient confidence to apply for those jobs without encouragement," a woman chemist says. Ramey refers to this phenomenon as a need for "mentorship." Advice and support given to a young chemist seeking an academic position are absolutely vital. "A mentor network is beginning to form among women scientists," Ramey says.

Some departments are making a more conscious effort to encourage their women students and postdocs to apply for academic jobs. "I see in this department a number of young women who are being encouraged by their sponsors to go out there and fight for good jobs," says Dr. Josef Fried, chemistry chairman at the University of Chicago, for example. "It is quite obvious that the number of qualified women applying for academic positions just has to be increased," he says.

There is a feeling among women that even the applicants who make their way through to the interview stage--having overcome any prior lack of self-confidence--are not then taken seriously. "So-and-so was invited to give a seminar, and then was introduced as Mrs. So-and-so instead of Dr. That doesn't happen to men." Or, "She was invited to give a seminar just to satisfy the affirmative action people that a diligent search was made." Whatever the basis for such accounts--whether fact or fiction--they are told and retold, dampening the enthusiasm of some prospective job applicants in the process.

Women also are encouraged in other career directions, and many, apparently, are choosing not to enter academic chemistry. One option is industrial employment. "My impression is that there are just so many opportunities for female chemists in industry, particularly in my field," says one analytical chemist, explaining why so few women analytical chemists seek academic jobs. Few men are seeking university positions in analytical chemistry, either, he points out.

There is a broadly held attitude that industry can be a "fairer" place for women chemists than is the university. "Major universities have been able to disregard equal employment opportunity legislation as far as tenured faculty is concerned," Dr. Philip H. Abelson, editor of Science, told a gathering of women scientists in New York City last spring. "The situation is quite different with respect to industry."

Whether or not opportunities are actually better for women in industry than at universities, women receive the impression that they are. And, when it comes to starting salaries, men and women are treated more equitably in industry. According to ACS's 1977 survey of starting salaries, inexperienced men and women Ph.D. chemists received the same salary offers from industry, averaging $20,038 for men and $20,042 for women. At universities, however, starting salaries offered to women averaged $10,580, 17% lower than those offered to men. And this difference was greater in 1977 than it had been in 1976.

Women also tend to gravitate to particular areas of chemistry--particularly biochemistry but also, to a lesser degree, to crystallography. "Biochemistry is wild and wooly and young, and a much better place for a woman as far as getting recommendations is concerned," says one chemistry department chairman. Indeed, a large part of the movement into biochemistry reflects that field's enormous recent growth, based on heavy federal support. Men, too, have been flocking to biochemistry, but women seem to be going there in larger proportions.

Several people have tried to suggest explanations for this trend. Biochemistry requires less training in mathematics, and many women are believed to shy away from math. Both men and women mention this antimath bias as an influence on the careers women choose. However, crystallography is highly mathematical, and women are found there, too, in surprisingly large numbers.

Another explanation, and one that holds true for both of these areas, is that the success of a few women in these fields a generation ago makes it much easier for young women to break into them now. Nearly all of the noted women in chemical science have been either biochemists or crystallographers, and their examples influence where women seek careers now.

What, then, is the overall outlook for women who decide they want careers in academic chemistry? Nearly everyone agrees it is getting better. The only question is how much so? "The situation certainly is better now that it was 10 to 20 years ago," says Harrison. "One may not be happy with the degree of progress, but there has been some." Others feel the same. "It's okay for a woman to do all right now," says another woman chemist, "and that is a big improvement. But making that last step, to really having the same clout as men do, that's going to be tough."

"I wouldn't want to make this picture too rosy," says one department chairman. "There are individual faculty members who think women will never compete. They will admit that in their courses they have women who are excellent, equal in every way to the men. But they look back and see that women have not made it as faculty members, and they don't think they will make it now." Still, he continues, "I have observed a change in the expectations of women, and I think the faculty also have a new attitude toward women at the university."

"We're very pleased," Cerny says, about hiring--with tenure--the first woman for the Berkeley chemistry department. The search for a candidate was deliberate and aggressive, according to Cerny. It was at times bitter and frustrating, according to others. Some critics thought the courtship too protracted. But the fact that the vows were made with tenure implies a sense of unequivocal commitment that might alleviate some of the bad memories.

"I think it's a big step from zero to one," Cerny says. "I agree that one out of 56 isn't very many, but the vector is pointing in the right direction, and I think things will be changing." A lot of bright women chemists are counting on just that.

OF POSSIBLE INTEREST

A summer institute for women in higher education administration will be held July 1 through July 26, 1979 on the campus of Bryn Mawr College. The program will focus on institutional governance and planning, on finance and budgeting, personnel management, government relations and administrative computer applications. Attention will be given to career planning with emphasis on the development of professional networks, mentor relations, and other support systems. Participation is limited. The cost

for the Institute, including tuition, room and board will be $1500, and in addition a $75 non-refundable application fee. For further information write to: Bryn Mawr College/HERS Mid-Atlantic Summer Institute, Bryn Mawr College, Bryn Mawr, PA 19010.

Women's Studies Newsletter, now the official journal of the National Women's Studies Association, is a 32-page quarterly journal containing news and feature articles, teaching aids and bibliographies, samples of student work from women's studies courses, news of legal developments pertinent to women and to women's studies, and a Newsbriefs section. Individual subscriptions are $7 for one year. Write to Women's Studies Newsletter, Box 334, Old Westbury, NY 11568.

The Association for Women in Computing has recently been founded. The first year will be spent refining the definitions of the purposes and policies of the organization, drawing up a constitution and by-laws, interfacing with similar organizations, and electing the first slate of officers. For information write Lorraine M. Duvall, Founding President, AWC, IIT Research Institute, Box 1355, Branch Post Office, Rome, NY 13440.

A white male high school dropout earns substantially more than a white female with a college degree, a new federal study shows. White male dropouts averaged $9,379 earnings in 1976; white female college-educated women earned $7,176.

Women now represent a total of 10.2 percent of the members of all state legislatures. Figures from the National Women's Education Fund show that the recent election increased their presence from 703 to 761. More than 25 percent of New Hampshires' legislature is now female. In the Colorado, Vermont, Connecticut, and Washington legislatures, they comprise from 18 to 22 percent. In six states--Mississippi, Louisiana, Alabama, Arkansas, Tennessee, and Utah--women comprise less than 4 percent.

For the past five years, Glamour has conducted an annual Search for Outstanding Young Working Women to recognize the accomplishments of young women who are making unparalleled strides in their respective fields--as professionals and as women. Any woman who wishes to enter can get an application by writing: Search '79-'80, Glamour Magazine, 350 Madison Avenue, New York, NY 10017. The women who are selected will appear in the February '80 issue of Glamour and will receive a gift from the editors.

ATTENTION, SCIENTISTS AND ENGINEERS:

The Task Force for Women in Science and Engineering has undertaken the task of compiling a directory of Federal women in scientific and engineering jobs. Once compiled, the directory will be used in a variety of ways: To send out information to persons in the directory, to aid organizations in recruiting scientific and technical women, and to help locate women willing to speak about their careers in training courses or special programs. If you are a Federal woman in the physical sciences, the biological and life sciences, the social and behavioral sciences, computer sciences, or mathematics, and if you are interested in being included in this nationwide directory, write to Joan Humphries, National Science Foundation, Room 517, 1800 G Street, N. W., Washington, D. C. 20550. Include your name, address, discipline, phone number, and agency. The task force members hope to have the directory ready for distribution by June 1, 1979.

DEADLINES: **May 24 for July-Aug., July 24 for Sept.-Oct.**

ADDRESSES: **Send all copy to Anne Leggett, Dept. of Math., University of Texas, Austin, TX 78712.**
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 $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 Hartford. Dept. of Mathematics and Physics. Opening for Assistant Professor in Mathematics and Computer Science, Fall, 1979 semester. PhD required and candidate must have research interests in applied mathematics and computer science. Evidence of good teaching expected. Application and references should be sent to Dr. Cecilia Welna, Chmn., Dept. of Mathematics and Physics, University of Hartford, West Hartford, CT 06117.

Pittsburg State University. Dept. of Mathematics. (1) Temporary instructor for 3 sections of trigonometry or comparable undergraduate mathematics courses per semester. Bachelor's degree and advanced graduate work in mathematics required. Master's degree and teaching experience preferred. Salary: $12,000-$15,000 per section. (2) Temporary instructor or assistant professor for undergraduate mathematics, possibly 1 graduate course if appropriate. Teaching load approximately 12 hrs. per semester. MA in math required, PhD and teaching experience preferred. Salary: $12,000-$16,000. By June 1,1979 send vitae and 3 references to Dr. Helen Kriegsman, Dept. of Math, Pittsburg State University, Pittsburg, Kansas 66762.

University of Maine at Orono. Dept. of Mathematics. Instructorship in mathematics. Master's Degree in mathematics, statistics or computer science required. Full-time academic year appointment starting 9/1/79. Renewal possible for second year. 12 hour teaching load in service courses. Previous teaching experience desirable. Salary depending on credentials. Please send vita, transcripts and 3 letters of recommendation to Gary Haggard, Chmn., Dept. of Mathematics, Univ. of Maine at Orono, Orono, ME 04469.

Western Michigan University. Assistant Professorship in Mathematics Education starting Fall, 1979. Teaching courses in mathematics and mathematics education. Curriculum development and research in mathematics education. Two year term with possibility of renewal. PhD or Ed.D in Mathematics Education with strong emphasis in mathematics required. Teaching experience at elementary or secondary level, preferably at the secondary level. Background and interest in uses of calculators/computers or applications of math modeling in school mathematics. Contact: Dr. James H. Powell, Chairman, Dept. of Mathematics, Western Michigan Univ., Kalamazoo, MI 49008.

Trenton State College. Dept. of Mathematical Sciences. Opening for PhD in Computer Science with specialization in operating systems and teaching experience preferred. Responsibilities: 24 semester hour teaching per year, involvement in graduate and undergraduate curriculum development, department and college wide committee work. Send vita to Dr. V. R. Price, Dept. of Math Sciences, P. O. Box 940, Trenton,N.J.08625.

U. S. Merchant Marine Academy. Dept. of Mathematics and Science. Assistant Professorship. Will teach analytic geometry & calculus. Master's degree required; Doctorate preferred with some college level teaching experience; also prefer specialization in some area of applied mathematics. Commerce employees who meet qualifications may apply by submitting Merit Promotion Interest Statement, Form CD-261 with a Resume. All others should submit a Standard Form 171 or Resume. Contact L. A. Ferrari, Head, Dept. of Math & Science, U. S. Merchant Marine Academy, Kings Point, N. Y. 11024.

Oregon State University. Climatic Research Institute. Computer Programmers with at least two years experience in scientific applications are invited to apply for position of Research Assistant. Unclassified duties include working with geophysical fluid dynamics models of atmosphere and oceans with emphasis on large data bases on 4th and 5th generation computers. BS in computer science, math or physics required. Salary $12,000 to $16,000 depending on previous experience. Apply by May 1 to Robert L. Mobley, Dir. of Computations, Climatic Research Institute, Oregon State University, Corvallis, Oregon 97331.

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.

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May, 1979