

Association for Women in Mathematics

Volume 14, Number 5

NEWSLETTER

September-October 1985

We deeply regret to report the passing of Julia B. Robinson. She died after a long illness on July 30, 1985. Not only an outstanding mathematician, she was a valued and respected friend of AWM. We will miss her. A program in honor of her memory will be organized for the winter meeting in January.

PRESIDENT'S REPORT

Kovalevskaja Symposium. The fall meeting in Amherst will have three special sessions coordinated with our symposium on the legacy of Sonia Kovalevskaja. AWM, in conjunction with the Bunting Institute, will present a program in Boston on Sunday evening, October 27, 1985 and Monday, October 28, 1985. It should be stimulating and exciting. I hope to see many of you there.

Fund Raising. Our fund-raising efforts have been concentrated in the Boston area, mainly because a few devoted members have been willing to spend time and effort on this endeavor. To broaden effectively the scope of our activities, we do need to sustain and increase this effort. It is time for some new faces and new ideas. If you'd like to become involved, please get in touch with me or Alice Schafer, chair of the Fund Raising Committee.

Linda Keen
Department of Mathematics and
Computer Science
Lehman College, CUNY
Bronx, NY 10468

AMS ELECTIONS

All candidates for vice-president and member-at-large who were listed in the May *Notices* were invited to write a statement for this *Newsletter*. Suggested topics were women in math, minorities in math, the role of the AMS Council, and promotion and tenure practices. The David report and its implications was given as a topic of special interest this year. (Due to an ambiguity in the wording of the letter, some candidates may have felt that the David report was the only topic for discussion this year.) Late responses will appear in the next issue.

Vice-president

Richard Askey, University of Wisconsin-Madison

There are a number of important aspects of the report written by the David Committee. First, there is the excellent appendix, *Ordering the Universe: The Role of Mathematics* by Arthur Jaffe. This should be read by all mathematicians, for each of us can learn something from it, and it should be shared widely with nonmathematicians. Jaffe has succeeded in doing something that many thought was impossible: he explained some very important applications of mathematics without getting tied up in technical details. If a large number of mathematicians can learn to write like this it will be much easier to solve some of our problems, for others will start to understand the fundamental role of mathematics in a complex society.

While it is necessary that federal funding of mathematical research increase if we are to continue attracting enough bright young mathematicians, both for research and for teaching, there are things some mathematicians can do to help raise more money. If you are at a university that has research money that can be used to support research assistants and postdoctoral research associates, don't let the chemists and high-energy physicists ask for more than you ask for. They may still get more, since they have years of experience in knowing how to ask for money, but it is possible to learn from them. It is probably necessary for a few more people in your department to serve on committees, to work hard on these committees, and to share the lessons they learn with other mathematicians, but this is an investment that will pay off. It is also necessary to start working with the University News Service to help them understand the necessity of articles about mathematics and mathematicians. The above advice is really advice to me and my colleagues at the University of Wisconsin-Madison, but similar advice can be given to almost any mathematician: just adapt it to your own situation and see what you can do to help.

If the David Committee report can help us regain the optimistic view of the future that we had twenty years ago it will be a major step, even if it does not generate as much federal support as it should. We have to realize that it is just a first step toward solving a very important problem.

Linda Keen, Lehman College, CUNY

The main purpose of the AMS is to promote mathematics research in the United States; this entails much more than publishing journals and holding meetings. The Society must address the problem of how to raise the levels of support for basic mathematical research and graduate education, particularly with respect to the issues that the "star wars" policy of the administration raises. The membership is broad and many faceted, including many groups with special needs and special interests. It is important that the officers be aware of these differences and needs. Among these groups are women and minorities. They are especially vulnerable when competition for funds is high. The Society must also face the problem of how to attract the best students into mathematics. Here again, a special effort must be made to recruit women and minorities, since they are often directed elsewhere.

Olga Taussky-Todd, California Institute of Technology

I intend to continue my concern for the general welfare of mathematics and of mathematicians. I have personally experienced unemployment, voluntary part-time as well as regular employment in universities, and government service in several countries.

I have devoted much of my time to the education of my own students and others (both men and women) and the development of their careers, as well as to my own research, in various fields.

Member-at-large

Jane Gilman, Rutgers University

The David report documents the basic fact that mathematical research is not supported by the Federal government to the same extent that basic research is supported in other fields. The support of mathematics, which has decreased dramatically in the past twenty years, is so low that the field may not be able to renew itself. Most important the report articulates *why* support of basic mathematical research is in the national interest.

(1) The mathematical community must use the information in the David report to educate itself and the larger world as to why mathematical research is important and to try to bring research support to an appropriate level. The report's articulation of exactly why basic research deserves support is of prime importance: Most mathematicians do mathematics because they enjoy it. We are not generally well-educated about how mathematics is connected to the larger world and why our research is essential.

(2) The mathematical community must also use the David report to try to explain to University and College administrators the realities of funding in the scientific community in order to better protect its own members who are competing for intrauniversity resources. If 66% of all physicists are federally funded and 47% of all chemists are, but only 22% of all mathematicians do grant-funded research, University and College administrators have no way of knowing that a non-funded mathematician may be of greater stature in his or her field than a funded chemist or physicist. Until mathematical support catches up with that in other fields, the mathematical community should seek methods short of funding that provide recognition to those people who are doing significant research without funding.

(3) Finally, we must use the David report to promote frank and open discussions within the mathematical community about the importance of both the more active and the less active researchers to the health of mathematics as a whole.

Vadim Komkov, Winthrop College

First, let me make a general statement. I have been and I am an enthusiastic supporter of minority and women's rights, and am opposed to any form of subtle or hidden discrimination. I oppose practices of paying less for equivalent work. Such practices are as common in academia or professional societies as anywhere else.

I observed some practices of hidden discrimination, such as a rapid promotion of the only man in a group of workers thus bypassing better qualified and senior women.

Traditionally women have been discouraged from studying science and mathematics, and unfortunately, the effects of such "traditions" are still with us.

Hopefully, no college administrator would dare to offer a lower starting salary to an equally qualified woman or minority mathematician, but there is still a disproportionately small number of women and minorities entering our profession, and the system is failing when it comes to promotion of women and minorities to higher administration either in academia or in industry.

Promotion and tenure practices fail to reflect the reality that frequently women have specific problems: pregnancy, raising of children, pressures of "traditional" family life. Blindness to sex or race is not necessarily an enlightened policy. Such a doctrine of full impartiality announced by Bradford (a Reagan appointee) regresses advances made by women and minorities. To the best of my knowledge such negative policies promoted by the present administration have not been opposed with any vigour, if at all, by any professional society or professional association in the U.S., such as A.M.S., A.S.M.E., etc. I wish to assure your Association that you have an ally if I get elected.

I have several comments concerning the David Report. One concerns the past inability of mathematicians to champion their cause and passive acceptance of an inferior role. Every year since 1964 (when I joined the A.M.S.) I observed mutual admiration among our leadership at each annual meeting, while our ability to get funds was diminishing (as compared to other societies), our ability to support some young, or not so young, talent was decreasing, and a concentration of wealth was in progress. The "top" rich institutions got the funds, increased their overhead, and did little suffering, while as the Bible says, those that had little had even that taken away from them.

The Reagan policies made this bad situation into something much worse.

It is not clear to me what remedies the David Report does propose. It is clear to me that we have to do something and we have to be aggressive about it.

Chuu-Lian Terng, Northeastern University

The main goal of the AMS should be to promote and support mathematical research and graduate education, through organizing meetings and publishing journals. However there are other mathematical goals in which the AMS can play an important role. These include (1) encouraging able young people to go into mathematics, (2) preventing a repetition of the recent wide swings of employment and government funding, by careful future planning, and (3) encouraging women and minorities to enter mathematics and assuring their equal opportunity. Since as a woman I am personally aware of some of the extra difficulties women in mathematics can come up against, this third goal has special importance to me.

William A. Veech, Rice University

The report of the David Committee amply supports one basic premise upon which its formation was based: an explosion of growth in Computer Science and a loose definition of "mathematical research" masked a decline in support for mathematics at the federal level over the past 20 years. To this I would add the obvious: the same phenomenon has been observed at many universities during the same period. There are now indications the pendulum is swinging in favor of mathematics. However, there is more reason for optimism at the university level, at least short term.

In the first place, the mission-oriented agencies are not altering recent funding policies, at least not radically. And while the NSF has given preferential treatment to mathematics the past couple of years, the "new" money has not restored the lustre to the jewel of its crown, the summer research program. While "fairness" arguments are unpersuasive at the federal level, mathematicians must continue to press the argument: There is genuine underfunding of mathematics in relation to the other sciences (e.g., when measured by the fraction of researchers receiving federal support), underfunding which threatens the scientific-technological health of the US.

My optimism at the local level is prompted by a number of "demand pull" factors, including: (1) during the "glut" of the 1970's mathematicians and industry "found" one another, the former discovering challenging mathematics in industry, and the latter discovering minds at home with the subtleties of mathematical reasoning have capacity for growth critical for work when technologies are advancing rapidly; (2) the mathematics cutbacks by universities in the 1970's, combined with increased service loads, have left many mathematics departments ripe for staff increases; (3) underproduction of mathematics Ph.D.'s is reflected by welcome inflation in entry-level salaries; (4) senior positions are already open (practically) everywhere; and (5) a dearth of quality applicants for graduate study is causing an inflation, also welcome, in graduate stipends.

While the case for mathematics must and will continue to be pressed in both the federal and university arenas, I propose a third arena, the private foundation. At most foundations the support of mathematics is surely proscribed by charter, but I believe we will find some where it is not. A term on the NSF Advisory Panel

persuaded me a nearly complete lack of fellowship opportunity for mathematicians above the age of 32 (Sloan cutoff age) is a funding lacuna which should be filled, but this lacuna is unlikely to be filled by NSF any time soon. (For example, the Panel unanimously recommended in 1981, to no avail, that NSF initiate an intermediate/senior level fellowship program.) A source or consortium of sources, providing, say \$3 million/year, would enable upwards of 60 mathematicians/year, unfettered by teaching or administrative responsibilities, to pursue research anywhere: at her or his home university, at one of the institutes, at another domestic university, or even abroad. AMS or AMS-SIAM could play a role in the selection/administration process, if necessary. Of course, this is but one example of how the foundation(s) might contribute to the support of mathematical research.

KOVALEVSKAIA SYMPOSIUM

A symposium in honor of Sonia Kovalevskaia will be held at Harvard University, Cambridge, Massachusetts on Sunday evening, October 27 and Monday, October 28, immediately following the Amherst meeting of the American Mathematical Society. The symposium has been organized by the Association for Women in Mathematics in cooperation with the Mary Ingraham Bunting Institute of Radcliffe College. The academic year 1985-86 marks the fifteenth anniversary of the Association for Women in Mathematics and the twenty-fifth anniversary of the Bunting Institute. This dual occasion provides an apt framework in which to celebrate the mathematical accomplishments of Sonia Kovalevskaia, the first woman to receive a doctorate in mathematics, and to present the work of mathematicians who are today working in related fields.

Sonia Kovalevskaia did some of her most important work, in analysis, applied mathematics, and mathematical physics, just about a century ago. There has been a recent resurgence of interest in her approaches and her results. This symposium will be the first occasion in recent years of bringing together mathematicians to honor her legacy.

The symposium will begin on Sunday evening, October 27 in Cronkhite Hall, Harvard University, with registration from 5 to 7 p.m. and dinner at 7 p.m., followed by the opening lectures. The program will continue through Monday, October 28. Note that three of the Special Sessions at the AMS Amherst meeting (October 26 and 27) will be coordinated with the Kovalevskaia Symposium. They are:

- An introduction to quasi-crystals, Jean Taylor, Rutgers University
- Non-linear problems arising in physics and geometry, Lesley M. Sibner, Polytechnic Institute of New York
- Sonia Kovalevskaia, major currents in 19th century mathematics, Jane Cronin Scanlon, Rutgers University.

The following is a tentative schedule for the symposium lectures.

Sunday, October 27:

- 7:30 - Nancy Kopell, Northeastern University
"Symmetry, Entropy, and Coherence in Chains of Oscillators"
- 8:30 - Ann Hibner Koblitz, Moscow State University (visiting)
"Sophia Kovalevskaia: A Biographical Sketch"

Monday, October 28:

- 8:30 - Chuu-Lian Terng, Northeastern University
"Some Geometric Development Related to Kovalevskaia's Top"
- 9:30 - Mark Adler, Brandeis University
"Kovalevskaia's Method of Abelian Varieties in Mechanics"

- 10:45- Jean Taylor, Rutgers University
"Geometric Analysis in Crystalline Media"
- 11:45- Patricia Bauman, Purdue University
"Large time Behavior of Solutions to Conservation Laws in Several Space Dimensions"
- 2:00 - Michael Shub, Queens College (CUNY)
"Some Linearly Induced Morse-Smale Systems, the QR Algorithm, and the Toda Lattice"
- 3:00 - Nancy Hingston, University of Pennsylvania
"Topology in the Symplectic Group"
- 4:15 - Linda Ness, Carleton College
"The Moment Mass of Symplectic Geometry and Geometric Invariant Theory"

The Organizing Committee for the Kovalevskaja Symposium consists of:

Linda Keen*	Herbert H. Lehman College (CUNY)
Linda Rothschild*	University of California, San Diego
Bernice Auslander	University of Massachusetts, Boston
Pamela Coxson	Mary Ingraham Bunting Institute, Radcliffe College, Harvard University
Michele Vergne	Massachusetts Institute of Technology.
*Cochairpersons	

Registration fees are: \$3 for AWM members
 \$5 for non-members
 \$1 for students or unemployed.

A block of rooms has been reserved for participants in the Symposium at the Quality Inn, 1651 Massachusetts Avenue, Cambridge, MA 02138. Reduced prices of \$60 for single rooms and \$71 for double rooms are available if booked before September 27. Early booking is advised, and the Kovalevskaja Symposium must be mentioned in making reservations. The telephone numbers are 1-800-321-2828 and 617-491-1000. Additional information about other accommodations (including bed-and-breakfast) will be sent upon request. Reservations for dinner on Sunday, October 27 must be made before October 13. The form below (or a xerox of it) should be sent to Margaret Munroe, AWM, Box 178, Wellesley College, Wellesley, MA 02181.

I wish to attend the Kovalevskaja Symposium. My check, payable to AWM, is enclosed.

_____ Registration fee
 _____ Dinner, Sunday, October 27, 7 p.m. (\$17.50)
 _____ Please enroll me as a member of AWM (\$10)
 _____ TOTAL

Name _____ Address _____
 Telephone _____

_____ Please send me additional information about accommodations.
 _____ I will need transportation from Amherst to Cambridge on Sunday, Oct. 27.

REPORT OF THE TREASURER: JUNE, 1985

Accounting for the period June 1, 1984 to May 31, 1985

BALANCE as of June 1, 1984\$43,338.14
 Total Assets, June 1, 1984\$43,450.02
 Note: The figure \$43,450.02 represents \$43,338.14 cash-on-hand plus
 5 shares of Washington Water Power, valued at \$111.88 as of 5/31/79.

Receipts

Dues - Individuals	\$13,164.25
Families	980.00
Institutional	4,610.85
Advertising Fees	890.00
Contributions	1,930.00
Raytheon Grant	5,000.00
Returned Speakers' Bureau Honoraria	1,850.00
Interest	2,170.16
Miscellaneous	444.11

TOTAL RECEIPTS\$31,039.37

Expenses

Wages & FICA (1)	\$6,835.55
Newsletter (2)	6,698.84
Dues & Fees (3)	245.25
Operating Expenses (4)	2,018.42
Speakers' Bureau (5)	13,921.89
Raytheon Grants (6)	4,252.32
AWM National Meetings (7)	2,070.19
AWM Regional Meetings	66.99
Kovalevskaja Symposium	35.73
Massachusetts Income Tax	123.88
CBMS Meeting Travel Expenses	145.00
Miscellaneous	137.26

TOTAL EXPENSES\$36,551.32

BALANCE as of May 31, 1985\$37,826.19

- (1) Part-time Administrative Assistant.
- (2) Typing, postage and printing.
- (3) Conference Board of the Mathematical Sciences, Massachusetts Incorporation Fee, Bulk Mailing Permit Fee, AMS-Math Sciences Professional Directory.
- (4) Postage, phone, supplies, duplicating, IBM Typewriter Service Contract.
- (5) Wages for the Director of the Speakers' Bureau, Wages for clerical help, plus phone, postage and duplicating expenses.
- (6) Grants to women high school teachers to learn Pascal and/or Data Structures.
- (7) Travel expenses & honorarium for Emmy Noether Lecturer, AWM social events, plus partial travel expenses for some officers.

Membership Statistics: Our mailing list totals about 1450 including institutions and members in Canada and abroad.

Respectfully submitted,

Lynnell E. Stern, Treasurer

AWARDS AND HONORS

Dr. Barbara Peskin of Mt. Holyoke College has been awarded a Fellowship in the Science Scholar program of the Bunting Institute for 1985-86. Her project title is "An Examination of Quotient-Singularities in Characteristic p ".

Dr. Mary Beth Ruskai has been elected President of the New England Chapter of the Association for Women in Science. She will serve as President-Elect in 1985-86, President in 1986-87, and Past-President in 1987-88. One of her goals is to increase the interactions among members of AWIS, AWM and other organizations in the greater Boston area. This year, for the first time, AWIS had a joint meeting with AWM, which was very successful. She hopes to repeat this and to have more joint meetings with organizations representing other disciplines, such as the Society of Women Engineers.

Dr. Ruskai received her Ph.D. from the University of Wisconsin in 1969. She was Battelle Fellow in Theoretical Physics at the University of Geneva and Assistant Professor in Mathematics at the University of Oregon. Her visiting appointments include positions at MIT, Rockefeller University, the University of Vienna, and Bell Labs. She currently holds a 2-year appointment as a Science Scholar at the Bunting Institute of Radcliffe College. In September, she will return to the University of Lowell, where she is Associate Professor in Mathematics. She has done research in several areas of mathematical physics. Her current interest is multi-particle Schrödinger operators, particularly those involving coulomb interactions since they are important to our understanding of atoms and molecules.

Julia Knight and Nancy Stanton, both of the University of Notre Dame, have been promoted to the rank of Professor of mathematics. Congratulations!

Professor Olga Oleinik, head of the Department of Differential Equations, Faculty of Mechanics and Mathematics, Moscow State University, was awarded an honorary doctorate by the University of Rome in May 1985. She also spent several weeks lecturing at various other Italian universities in spring 1985. About two years ago she lectured extensively in Paris and was elected a Foreign Member of the Royal Society of London, the British counterpart to the National Academy of Sciences.

Professor Lilia del Riego, a differential geometer at the Universidad Autonoma Metropolitana - Iztapalapa, has been nominated to appear in *Who's Who in the World*.

Congratulations to Julia Bowman Robinson, University of California, Berkeley and Karen K. Uhlenbeck, University of Chicago, who were recently elected to the American Academy of Arts and Sciences, and to Yvonne Choquet-Bruhat, University of Paris, who was elected a foreign honorary member.

Congratulations also to E. Sharon Jones, Towson State University, who received an award in the first year of the National Science Foundation's College Science Instrumentation Program (CSIP). CSIP was established by the NSF to strengthen and support science and engineering instruction in predominantly undergraduate four-year colleges and universities.

Dr. Jacqueline K. Barton, Assistant Professor of Inorganic and Biophysical Chemistry at Columbia University, was presented with NSF's Alan T. Waterman Award on May 15. Dr. Barton has earned international acclaim for her creative use of inorganic chemistry to design molecules that recognize and modify DNA, the central coding molecules of genes. Dr. Barton is the first woman to receive the Waterman Award, which is given annually for recognition of outstanding capability and exceptional promise for significant future achievements demonstrated through personal accomplishments in science or engineering research. The award includes a medal and NSF grants of up to \$100,000 a year for three years.

AWM MEMBERS SPEAK

AWIS New England newsletter, Volume V, Number 9, April 24, 1985
from "President's Column" by Shadia Habbal

At our April monthly meeting, organized jointly with the Association for Women in Mathematics, Dr. Mary Gray, the Chair of the Department of Mathematics and Computer Science at American University, addressed a very enlightening topic: Statistics and the Law. She discussed the role of statistics in jurisprudence. Her talk was lively with examples drawn from cases where probability evidence was misused in a trial. She also dealt with cases of employment or salary discrimination, as well as discriminatory pensions, based on the misuse of statistics. We thank Dr. Gray for such an interesting presentation.

The SMC Student Math Connection, Saint Mary's College, Notre Dame, Indiana, May 1, 1985
"Professor Jeanne LaDuke Speaks to Math Students" by Gail Kraft

In March many of us had the opportunity to hear Professor Jeanne LaDuke of DePaul University speak on the first great American women mathematicians. Professor LaDuke along with Judy Green has done extensive research on the American women who received Ph.D.'s in mathematics before 1940. They have found 227 such women. LaDuke's speech was based on numerous statistics which they have compiled along with insights into individual obstacles these women faced as they tried to make their way in mathematics.

Professor LaDuke not only addressed math majors on the 24th of March but was also able to see our students in action at the Annual Michiana Math Contest for high school women. As featured speaker at their awards ceremony she commented that "Never have I been with so many women mathematicians gathered for one purpose twice in 2 days!"

AWM PANEL AT ICM

The AWM panel at the International Congress of Mathematicians (ICM) in Berkeley next summer will be entitled "Women in Mathematics: An International Perspective, 8 Years Later." The panel will be held on Wednesday, August 6, 1986, from 7:30 to 8:30 p.m. followed by a party/reception. This should be a good day for it, as it is midway through the Congress (July 30-August 11, 1986).

Anyone interested in participating on the panel should contact Lenore Blum, Chair, AWM/ICM86 Panel Committee, at Math. Dept., U.C. Berkeley, Berkeley, CA 94720, or one of the other committee members - Evelyn Silvia, Math. Dept. U.C. Davis, Davis, CA 95616 and Bhama Srinivasan, Math. Dept., Univ. of Illinois at Chicago, Chicago, IL 60680. We would like a good international representation and would like to emphasize common trends and themes: What is the current status of women in mathematics world-wide? How have things changed since Helsinki - our last international panel? Where should we be heading? etc.

OPPORTUNITIES AT THE BUNTING INSTITUTE

The Bunting Institute provides fellowships and opportunities to women scholars, scientists, visual and performing artists, musicians, and creative writers at the postdoctoral or equivalent professional stage to complete a substantial project in their field. Office or studio space, stipend, access to Radcliffe/Harvard facilities are provided. Deadline: October 15, 1985. Contact: Fellowship Program Applications, The Bunting Institute, Radcliffe College, 10 Garden Street, Cambridge, MA 02138, (617) 495-8212.

IN THE PIPELINE: A COMPARATIVE ANALYSIS OF MEN AND WOMEN IN GRADUATE PROGRAMS IN SCIENCE, ENGINEERING AND MEDICINE AT STANFORD UNIVERSITY

by Laraine T. Zappert, Ph.D., Clinical Instructor of Psychiatry, Department of Psychiatry and Behavioral Sciences, Stanford University School of Medicine, Stanford, California, and Clinical Psychologist, Cowell Student Health Services, Stanford University, and Kendyll Stansbury, Ph.D. Candidate, School of Education, Stanford University
continued in this issue from May-June Newsletter

Career Plans

In exploring their career plans, the respondents were asked to rate the importance of various factors in deciding on a career in science, engineering or medicine. As shown in Table IV, no significant sex differences were observed in the indices of Impact, Creativity, Status, Security or Work Pressure.

On the Impact Index, women more often than men felt it was important to have managerial responsibilities ($p < .05$). Both men and women felt that working for social change, having the opportunity to express their values, working with people, and being helpful to others were important characteristics of their career choice.

On the overall Creativity Index, men and women varied little, with both men and women reporting that the intellectual challenge and the opportunity to be creative were important or essential to their choice of careers. Significant sex differences did occur, however, in three areas. As shown in Table IV, more women (95%) than men (74%) felt it was essential/important that their work afforded them the opportunity to use their skills ($p < .05$). Nearly half the men compared with one-third of the women felt it was important or essential to have the opportunity to take risks in their career ($p < .01$). Similarly 76% of the men compared with 61% of the women felt it was important or essential to do seminal work in their field ($p < .01$).

While the men and women did not differ on the overall Status Index, men more often tended to view social recognition ($p < .05$) and the opportunity to take risks ($p < .01$) as more important than did women. Both groups felt high income potential was important. Again, more women than men felt managerial responsibilities were important ($p < .05$).

On the Security Index, both men and women rated the availability of jobs as important. Similarly, on the Work Pressure Index both men and women reported that compatible coworkers were important considerations, while low pressure and stress were viewed by both groups as being neither important nor unimportant in assessing their career choices. Flexible time schedules were significantly more often important for women than men, and accounted for the significant sex difference on the overall Work Pressure Index ($p < .05$).

When asked specifically about their career plans, the men and women were similar on the clarity of their career plans (clear), the number of career options they felt were open to them (many), and the need for additional training (little or none). On the average, women in our sample tended to decide on their careers about a year later than did men: the average for women was 16.2 years vs. 15.1 years for men ($p < .01$). More men (62%) than women (51%) expected to hold academic appointments ($p < .05$) with more than one-third of the women being uncertain about holding a faculty appointment. Fewer than one-quarter of the women compared with one-third of the men envisioned themselves as director of a laboratory ($p < .05$). Similarly, fewer women than men envisioned themselves as entrepreneurs ($p < .05$) or as the chief executive officer of a corporation ($p < .01$).

Coping Style

In the area of coping style, the respondents were asked a series of questions about how they perceived themselves in a variety of situations, and specifically those involving school. As shown in Table IV, significant differences between men and women were demonstrated on the indices of Efficacy ($p < .05$), Self-Confidence ($p < .001$), and Assertiveness ($p < .001$).

In the area of efficacy, both men and women reported that they sometimes dealt with problems by ignoring them as long as possible. Women, however, more often put pressure on themselves by feeling they should be doing more things ($p < .01$) and were less likely to trust their own judgment ($p < .001$) than were the men.

On the Self-Confidence Index, the most significant differences show up between men and women. Women more often than men report questioning their ability to handle their work ($p < .001$), finding criticism hard to accept ($p < .01$), fear that speaking up will reveal inadequacies ($p < .001$), and question their ability to make it in their field ($p < .001$). Men more often than women report feeling confident speaking up in class ($p < .001$) and trusting their own judgment ($p < .01$).

The Assertiveness Index was another area in which the women and men differed significantly. As shown in Table IV, women more often reported having trouble saying "no" ($p < .05$) and in giving criticism ($p < .05$). Women also more often reported having difficulty sticking up for themselves ($p < .01$) and tended to let annoyances pile up ($p < .001$). Men more often than women reported feeling able to set limits ($p < .01$) and negotiate for their needs.

In addition to the items in the indices, significant sex differences were demonstrated on several other items. Women more often than men reported that they sought help when faced with a problem ($p < .05$) and nearly one-third of the women compared with 15% of the men reported they often or always felt overwhelmed by their thesis ($p < .01$).

While there were no differences between men and women in their assessment of their ability to handle heated discussions with the same sex, women more often reported difficulty handling heated discussions with the opposite sex ($p < .05$).

Work and Family Integration

The sample of people responding to this part of the questionnaire was diminished by the relatively fewer married or cohabiting students ($N=237$) and students with children ($N=40$) who participated in the study. While significant sex differences were demonstrated in several areas, the results may have a more limited applicability by virtue of a smaller N .

When asked whether they would consider changing fields, university or location for their current partner, most men and women responded "no". Similarly, neither group indicated a willingness to significantly alter their career plans for their partner.

When asked about the stresses involved in integrating career and family demands, the men and women differed markedly in their perceptions. While nearly two-thirds of the women reported expecting or experiencing difficulty integrating work and family life demands, only one-third of the men felt this way ($p < .001$). Similarly, whereas 66% of the women reported anticipating or experiencing problems in the timing of children, only 25% of the men did ($p < .001$). Women more often than men reported envisioning themselves as taking time out to be a parent ($p < .001$), while both men and women were uncertain as to how this would affect one's career. Neither men nor women envisioned that the male partner in a relationship would take time out to be a parent.

For those students with children, nearly 50% of the women compared with 23% of the men felt it was very stressful to juggle multiple roles ($p < .001$). Women more often than men reported doing most or all of the household tasks and child care ($p < .001$), and nearly 50% of the women compared with 1% of the men reported that they stayed home when a child was ill ($p < .001$). Both men and women, however, reported being satisfied with the household and child care arrangements.

Social Support

No significant differences were found in the degree of social support measured by the Support Index. Both men and women reported sometimes feeling lonely, but rarely having trouble maintaining positive relations with friends. Men more often than women reported that their student status had a negative effect on opposite sex relations ($p < .05$). Women more often than men reported socializing with other students in their field ($p < .05$).

TABLE IV

Indices

	% Responding always or often		Chi ²	Sample Size ¹
	Men	Women		
I. Graduate Studies Indices				
A. Graduate Work Stress				
How often do you feel:				
Work is more than you can cope with	31	33	4.18	611
Work interferes with social life	50	53	3.62	604
Personal and financial concerns affect you	17	23	3.84	600
B. Social Relations				
How often do you feel:				
Faculty accessible when you need help	57	61	2.84	599
Other students accessible when needed	74	74	1.83	574
Approval of peers important to you	47	56	12.66*	605
Harmonious spirit in department or lab	57	57	2.99	513
C. Advisor Relations				
How often do you feel:				
Advisor promotes advancement	45	40	1.40	462
Feel free to disagree with advisor	68	65	11.00*	460
Ideas respected by advisor	66	65	9.78*	461
Know what advisor thinks of you	27	39	18.29**	488
II. Career Indices				
A. Impact				
How important is the following to your career choice:				
Managerial responsibilities	43	50	10.13	625
Working for social change	46	46	2.94	615
Opportunities to be helpful	80	78	2.10	622
Express values	69	66	4.31	619
Work with people	69	67	8.18	625
B. Creative				
How important is the following to your career choice:				
Intellectual challenge	99	99	4.53	624
Kind of people you work with	87	91	8.12	624
Opportunity to be creative	99	97	4.90	622
Chance to use skills	74	95	8.47*	621
Chance to take risks	45	33	14.36***	624
Chance to do seminal work	76	61	18.94***	622
C. Status				
How important is the following to your career choice:				
Managerial responsibilities	43	50	10.13*	625
High income potential	57	52	6.60	620
Social recognition	44	36	10.04*	623
Chance to take risks	45	33	14.36**	624

D. Security

How important is the following to your career choice:

Little pressure and stress	26	33	4.97	618
Availability of jobs	58	63	3.94	621

E. Work Pressure*

How important is the following to your career choice:

Little pressure and stress	26	23	4.97	618
Kind of people you work with	87	91	8.12	624
Flexible time schedule	67	77	18.29**	621

III. Coping Style Indices

A. Efficacy

How often do you:

Ignore problems as long as possible	18	15	1.73	623
Feel more things must be done	51	64	15.88**	622
Trust your own judgment	92	80	22.16***	614

B. Self-Confidence***

How often do you:

Question your ability to handle work	15	30	45.01***	621
Find criticism hard to accept	12	27	35.21***	622
Trust own judgment	92	80	22.16***	614
Feel confident in speaking up in class	57	30	43.62***	610
Fear being wrong in front of peers and professors	20	36	28.94***	620
Find few opportunities to ask questions	14	21	11.14*	604
Fear speaking will reveal inadequacies	9	33	43.35***	612
Question if you can make it in your field	9	24	35.51***	613

C. Assertiveness***

How often do you:

Feel able to say no	53	48	9.39*	619
Have trouble giving criticism	12	17	11.70*	621
Have difficulty sticking up for yourself	8	17	16.36**	617
Let annoyances pile up	25	30	21.56***	621
Feel able to negotiate for needs	62	42	30.07***	609
Find you can handle heated discussions with persons of same sex	72	79	2.44	588

D. Social Support

How often do you:

Feel lonely	19	23	6.76	622
Have difficulty maintaining positive relations with friends	6	4	3.18	612
Find your student status has a negative effect on opposite sex relations	15	10	10.92	594

*Indicates significance at 0.05

**Indicates significance at 0.01

***Indicates significance at 0.001

¹Sample size varies because of missing value

TABLE IV (Continued)

Indices

	% Responding always or often			
	Men	Women	Chi ²	Sample Size ¹
IV. Health Status Index				
A. Health***				
How often do you:				
Feel excellent most of the time	15	7	12.98	604
Feel depressed	7	19	50.25***	618
Feel tired in the morning	37	47	6.52	624
Feel happy and content with life	73	63	6.58	619
Feel lonely	19	23	6.76	622
Feel energetic and strong	70	61	6.70	624
Feel on the verge of a nervous breakdown	9	23	30.41***	618
Feel relaxed and carefree	39	22	27.69***	615
Feel life is too much for you	3	7	21.17***	619
Feel that graduate school is stressful	56	70	35.69***	613

*Indicates significance at 0.05

**Indicates significance at 0.01

***Indicates significance at 0.001

¹Sample size varies because of missing value

Health Status

For the most part, the men and women in the sample reported being in excellent physical and psychological health. As would be expected in a young, professionally-involved group, chronic somatic symptomatology and extensive psychological distress were largely absent among the respondents. Both men and women reported that they often felt happy and content with life, as well as energetic and strong. Use of alcohol was moderate, while tobacco was used by less than 15% of the respondents of either sex. Both men and women reported socializing with other students often, with faculty rarely, and reported few difficulties maintaining positive relationships with friends.

Men and women did differ in their patterns of drug and caffeine use, with men (35%) more often than women (20%) reporting the use of marijuana, cocaine, and similar substances, and women (10%) slightly more often than men (6%) reporting occasional use of sleep medication ($p < .001$). Sixty-three percent (63%) of the women compared with 46% of the men reported drinking caffeinated beverages often ($p < .001$).

The only significant difference reported in somatic complaints was in the area of stomach upsets, with significantly more women (35%) than men (17%) reporting sometimes or often having upset stomachs. Significantly more women (27%) than men (10%) reported eating too much when under stress ($p < .01$).

On the overall Health Status Index, significant sex differences between men and women emerged. As shown in Table IV, women more often than men reported feeling depressed, on the verge of a nervous breakdown and that graduate school was often stressful to them ($p < .001$). Men more often than women reported feeling in excellent spirits, relaxed and carefree in their lives ($p < .01$).

Finally, the women in the survey reported significantly more crises during graduate school than did the men ($p < .001$) and three times as many women (30%) as

men (10%) had consulted a mental health professional during the course of their graduate studies ($p < .01$).

DISCUSSION

In many ways the men and women in our sample were remarkably similar. As would be expected of a group of individuals pursuing advanced degrees at a major university, the men and women we studied demonstrated a high degree of professional commitment and interest, with a healthy perspective of themselves and their work. They brought to their degree programs an impressive set of credentials and previous experience, and mobilized their resources wisely to meet the challenges presented by their studies. They tended to seek solutions within themselves rather than externalize their discontent, and appeared to be well-suited to the university environment they had chosen for themselves. In general, one is left with the overall impression of a rather healthy, intelligent and dedicated group of men and women who were clear on their objectives, and dedicated to their pursuit.

The enthusiasm and energy of the population studied was evident in the rather surprising response rate to our questionnaire. Over half the population surveyed responded to the thirty-two page questionnaire mailed to them. While many of the questions were close-ended, they did, hopefully, require some thought and introspection, and in many instances we received complaints about the time it took to complete the questionnaire. Yet, in spite of this, the questionnaires were completed and in many instances substantially annotated. The men and women surveyed appeared to be genuinely interested in describing their experience as graduate students and in articulating their concerns. Their high response rate allows us to be fairly confident that our sample accurately represents the population of graduate students in science, engineering and medicine at Stanford. While generally the picture that emerged was a positive one, there were some areas which merit further discussion.

In spite of the similarities in academic backgrounds, the men and women in the sample differ significantly in their assessment of their ability in science and mathematics, two areas of central importance to their chosen fields of study. While both men and women report feeling very competent in these areas in high school, this assessment of competence diminishes for women, but not for men, at the level of college science and math. Additionally, women tended to feel their academic preparation was less adequate than did the men in our sample. Women's assessment of their ability in math and science diminished from high school to college, and, as well, their sense of being less adequately prepared for graduate school, are particularly notable in light of the fact that these women entered graduate school at Stanford with excellent test scores and academic records. This may be an instance of women, and perhaps others, significantly underestimating the level of competence and intellectual ability women bring to their graduate studies in science, engineering and medicine. It may also be that women perceive some lack of advanced preparation in particular specialties and subspecialties necessary for their field of study. These perceptions may or may not be accurate. Women would do well to make a careful assessment of the expertise and intellectual capabilities they bring to their discipline in order to avoid underestimating their own abilities. Additionally, such an assessment would enable them to identify areas where more advanced training might be useful.

A further point along this line is to note that women may not be alone in underestimating their capabilities. Our findings refute the unspoken, and even occasionally spoken, assumption that less qualified women are allowed into graduate programs in science, engineering and medicine because of affirmative action quotas. The following quotations illustrate the consequent loss of self-confidence experienced by some women:

#193 (female in engineering and physical sciences)

Many times females seem to be "questioned" rather than simply accepted when making technical statements.

#112 (female in engineering and physical sciences)

In most of my classes I am the only woman. I have a lot of confidence in myself but I was a little intimidated when I first started school. It seemed that a lot of males automatically assumed you were less qualified just because you were a woman. After a few weeks when they realized you could speak the same technical language this was not as much of a problem.

#215 (female in engineering and physical sciences)

It was pointed out to me that I was female and a minority and otherwise would not be at Stanford. Also no way would I be able to pass qualifying exams, etc., etc. ...Several times I nearly gave up because of this.

It is clear from our findings that Stanford has succeeded in attracting a highly qualified group of women students to its graduate programs in science, engineering and medicine without compromising academic excellence.

The issue of women, and perhaps others, underestimating their skill and potential is a consistent theme that emerges from several dimensions of the questionnaire. One of the principal areas in which the men and women in our survey differ is in that of self-confidence and assertiveness. Women reported feeling less sure of their ability, less trusting of their own judgment and more fearful of making mistakes than did men. Women also reported more difficulty setting limits and negotiating for their needs. The picture that emerges of the women in our sample is very similar to that of other women in non-traditional occupations (Zappert & Weinstein, 1981; Zappert, 1982). When women are relatively new to a field and present in low number, they report feeling less confident of their abilities, less willing to take risks, and less able to negotiate for their needs.

While the etiology of this rather consistent pattern among women in non-traditional fields is unknown, it is possible to hypothesize several contributing sources. Our research lends support to Rosabeth Kanter's (1977) assumption that being in the minority within work organizations is detrimental to the well-being of women or any other minority members. Analysis of our data demonstrated significant field as well as gender effects within the area of self-confidence, assertiveness and psychological well-being. Those fields within science, engineering, and medicine in which women were present in the largest number (medicine and biological and medical sciences) were the fields in which women demonstrated the least amount of self-doubt and reticence to assert themselves. Clearly, while there may be some self-selection of particular types of women within these fields, it would be important to observe whether changes occurred in the attitudes or behavior of women within departments once some critical mass of women was achieved.

From the psychological perspective, it is not difficult to understand how this issue of minority status would help undermine women's sense of their own efficacy and capabilities. By virtue of low number, visibility is increased. Higher visibility would tend to reduce the probability of risk-taking, particularly in the presence of any uncertainty of competence. Decreased risk-taking diminishes the opportunity to learn from one's mistake and develop a sense of confidence in one's judgment and ability. Thus the cycle can be self-perpetuating. One would expect that decreasing isolation and visibility, coupled with increased experience, would disrupt this process to women's advantage.

Another possible contributor to the pattern of women underestimating their own ability and demonstrating more self-doubt may be found in patterns of socialization. While our study did not focus on early socialization, it is clear that the women in our survey reported different patterns of influence on their decision to enter science, engineering and medicine. While both men and women report support from their family, teachers, and fathers, women reported less positive influence from their fathers on their career choice than did men, as well as a heightened influence of spouses, peers, teachers, bosses and other important figures in their lives. Our study appears to corroborate the greater affiliative needs of women, and to underscore the importance of such figures in a woman's decision to enter

nontraditional fields. Regardless of sex, external validation and support play a crucial role in making choices which depart from the norm. Ambivalence or discouragement would take on heightened significance for a woman choosing a nontraditional career. This has important implications for teachers, mentors and advisors of women students. It is also important for women to be aware of the influence they allow certain people to have in their lives, and be clear as to its impact on their decision-making process.

Along this line, one theme that emerged from our study was the critical importance of the student's relationship with their advisor. One student summarized the theme when she said:

#547 (female in engineering and physical science)

My experience at Stanford has been extremely positive--I give a lot of credit to my advisor as well as to a supportive spouse and family. Many of my colleagues in the same lab but with different advisors have had quite different--and not nearly as positive--experiences, which appear to relate strongly to relationship with advisors--an area worthy of study.

While there were no significant differences between men and women on overall relationships with fellow students, faculty and friends, women did appear less certain of the support and acknowledgement they received from their advisors. Further analysis demonstrated that this was the case regardless of the sex of the advisors. In fact, in some instances, it appeared as if women students felt more certain of their assessment by male advisors than by female advisors. Whether this derives from reticence on the part of women students to approach faculty advisors, perhaps because of the "feared incompetence" issue, or whether faculty advisors have greater difficulty dealing with the anomalous woman student, particularly in the area of constructive criticism of their work, we cannot determine from our study. Again, it is an issue which needs to be examined from both sides: How and under which circumstances do women and their faculty advisors construct barriers to effective communication and collegial interchange?

One issue that did emerge from the survey is the greater access that men have to informal interaction with their advisors outside of the advisor-advisee relationship, illustrated by the following comments:

#184 (female in biological and medical sciences)

My advisor frequently invites only the men to have lunch with him. The females usually assume it is a negative comment on our research.

#195 (female in engineering and physical science)

I don't go hiking with my advisor. I don't eat lunch with my advisor. I don't bullshit with my advisor like the boys do.

#240 (female in engineering and physical science)

No difficulties (with my advisor) but it would be easier if we could pal around then I would get more casual type guidance.

The contrast in experiences with advisors is illustrated by the following quotations:

#220 (male in engineering and physical science)

[My advisor has] gone out of [his] way time and time again for me--always willing to help with a variety of problems (academic and non academic) and he's an all round great guy!!

#240 (female in biological and medical sciences)

He's very busy, so discussions with him are never rambling exchanges of ideas, but are fairly cut and dried.

#254 (female in biological and medical sciences)

At first, I was working on something which didn't interest him, and he had NO interest in it (I spoke with him maybe for 30 minutes total in my first two years of grad school--I'm not kidding. Even now, he's interested in having a 5 minute synopsis of publishable data, but doesn't want to hear about problems/stumbling blocks.

The quality of interaction with advisors does not vary strictly along gender lines. Many men described brief and perfunctory interactions with their advisor. On the other hand, there were women who described their relationships with their advisors in the same glowing terms as the man above. Research (Kanter, 1977) shows that those in the minority in a group are more likely to be excluded from informal interaction, not by deliberate choice, but from unconscious processes.

Another analogous situation to the student-advisor relationship is the differential between men and women in publishing and responsibility with research groups. Again, while we cannot determine the relative contribution of each, one must ask whether women actually publish less, or less often hold responsible positions within research groups by conscious or unconscious choice, or whether the opportunity to publish with faculty and/or hold positions of leadership is somehow less accessible to women.

Awareness of the disparity between men and women in this area can increase the potential for changing the situation, particularly if women are interested in pursuing academic appointments. The differential pattern that emerged from the graduate student population is not unlike that which has been identified for faculty with respect to publishing and department chairs: women have historically published less and held fewer prestigious positions within faculty departments (Cole, 1979). Our research suggests that women differ from men in their patterns of aspirations. Fewer women aspired to faculty positions or envisioned themselves in positions of primary responsibility: Director of laboratories, CEO, or entrepreneurs. Whether this is an instance of women having lower aspirations and underestimating their own ability, or the result of women's reducing their expectations based on how few women have achieved these positions in the past, remains to be seen. The fact that the women in our survey felt it was more difficult to "make it" in their field than did the men is consistent with the latter interpretation.

It may also be that women have different aspirations from men because they are interested in integrating other aspects of their life with their work. Traditionally men have tended to define themselves occupationally, more so than have women. Women, even those of full professional responsibility, tend to assume primary responsibility in several other areas of their lives, especially familial roles of wife and mother (Zappert & Weinstein, 1981). Our findings suggest that, while most of the women in our survey are currently focused on full-time professional careers they, unlike their male colleagues, already anticipate difficulties integrating the demands of career and family life. More women students with children report stress juggling work and family roles than did men with children, as in the following instance:

#547 (female in engineering and physical science)

It is not always easy to see single, male colleagues (or even married but childless ones) move ahead faster or seem to get more credit--I need to keep remembering that I have chosen to take on more, and that I'm actually moving on a quite reasonable timetable for my lab as a whole.

Interestingly, women who report they do all or most of the household and child care tasks, did not express dissatisfaction with this arrangement. Clearly, women's willingness to assume major responsibility in these areas may contribute to the level of stress they experience.

It is important that both men and women recognize the costs as well as benefits involved in narrowing or broadening the focus of their lives. If some women are reading less in their field for leisure or setting their sights on less

all-consuming jobs in order to accommodate other interests in their lives, they need to be aware of the consequences of doing so. Alternatively, if some men and women are setting their sights on career objectives to the exclusion of personal and family relationships, the costs involved need to be clearly assessed in any decision making process. Those responsible for professional socialization should help students become acquainted with the variety of choices in the balance of professional and personal lives made by professionals in their field. Informed choice results in the healthiest outcome.

With respect to health, our findings underscore the general level of physical and psychological well-being among our respondents, both male and female. While clearly not all women scored lower than men on the Health Status Index, in general, women did report more feelings of depression, of being overwhelmed and finding graduate school more stressful than did men.¹ In addition, women reported more crises, particularly of an interpersonal nature, during graduate school. The respondents who scored lowest in the area of mental health were generally those who scored lowest on the Coping Indices. One can deduce that feeling less confident, less efficacious and less assertive does not square well with psychological well-being. One might conjecture that women who feel less confident, efficacious, etc., may internalize the blame for these shortcomings, thus contributing to their increased incidence of depression and stress. Such internalization would not allow for a more objective assessment of the factors external to oneself which could contribute to diminished self-esteem and personal efficacy. In order to avoid internalization of this sort, it is critically important for women to seek opportunities to compare experiences, particularly with other women students. This would allow them to assess the relative contribution of their own actions, as well as those of faculty and other graduate students, to the perpetuation of a dysfunctional situation.

The observed differences between men and women appear to be related to a variety of factors, some internal to the women themselves, and some deriving from structural and interpersonal variables inherent in women entering male-dominated fields. By focusing on women, we run the risk of interpreting these differences as a "woman's issue"; one which can and must be remedied by women themselves. Rather, because of the complex and multiple etiology, redress must come from the men and women entering the professions of science, engineering and medicine, as well as the social and academic community which welcomes them to their ranks. The fact that 20% of the women in the sample felt they had been the object of discrimination at some time in their graduate career cannot be interpreted as a "woman's issue". It has a profound effect on aspirations and well-being, and is enormously costly to academic scholarship.

Additionally, just as work in affirmative action has uncovered deficiencies in the hiring and promotion procedures which affect men and women alike, so examining the experiences of women in graduate school benefits both men and women students by identifying essential components of professional socialization, such as the advisor-advisee relationship and accurate assessment of achievement and proficiencies. This will enable departments to establish guidelines for the type and extent of socialization their students should receive.

Finally, in certain ways the news for women is good. One can learn to be more self-confident and assertive²; it's a more difficult task to learn to be more intelligent. The women entering degree programs in science, engineering and medicine at Stanford bring with them the necessary intellectual prerequisites for successful accomplishment of their career objectives. They, as well as their academic departments, need to appreciate and encourage women's future contributions to the academic and scientific community.

Notes

1. Some have suggested that women report more psychological distress because they are better able to identify their feelings and are less reluctant to acknowledge psychiatric complaints. After an extensive review of the literature, however, Weisman & Klerman (1981) conclude that a high incidence of

stress reported among women is not an artifact of their response pattern, but rather a consequence of more stressful experiences in their lives.

2. Recent clinical experience with women's support groups at the Stanford Business School has indicated that having the opportunity to discuss areas of mutual concern and doubt, as well as practice in negotiating skills, can greatly enhance women's sense of efficacy and confidence.

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WOMEN IN MATHEMATICS, SCIENCE AND TECHNOLOGY: FUTUREScape

contact person: Tina Straley, Department of Mathematics and Computer Science,
Kennesaw College, Marietta, Georgia 30061

In December, 1983, Kennesaw College hosted a prototype one-day program for 200 9th-12th grade female high school students and 50 teachers and counselors from schools in 7 neighboring counties. Thirty-four women in the community whose careers require study in mathematics and science served as presenters. The participants were assigned to groups of 15-20 in order to encourage interaction between students and presenters and allow for "hands-on" experiences. The program was so well received that the Board of Regents of the University System of Georgia with the cooperation of the Georgia Department of Education, organized nine programs, statewide; for 1985, five have already been held. The programs are held at units of the University System, distributed with consideration to geographic balance and minority participation. Financial support has primarily come from IBM, Southern Bell, Avon, AAUW, and the Southern Education Foundation. Additionally, each program committee raised a small amount locally. The uniqueness of this project is the statewide emphasis and the placement of programs so that every public high school has been invited to send representative students to a program in its area. This program has strived to reach outside of the urban areas in the south, where societal stereotypes and prejudices have been little changed, as well as the large urban areas.

OF POSSIBLE INTEREST

The next International Congress on Mathematical Education (ICME) will be held in Budapest, Hungary from July 27 to August 3, 1988. The International Organization of Women and Mathematics Education (IOWME) is organizing many activities for the ICME. The membership fee for IOWME is \$10.00. This four-year membership will ensure that you will be part of an active and exciting organization promoting quality mathematics education for girls and women worldwide. Write: IOWME, c/o Sherry Fraser, Lawrence Hall of Science, University of California, Berkeley, CA 94720.

The Faculty Exchange Center, a non-profit, faculty-administered program, helps arrange teaching exchanges on the college-university level, and house exchanges for study and travel for teachers and administrators at all levels of the education

profession. The current roster of members will be made available to new members upon registration. For more information send a stamped and self-addressed envelope to Faculty Exchange Center, 952 Virginia Ave., Lancaster, PA 17603.

Human Relations Media, 175 Tompkins Avenue, Pleasantville, NY 10570 produces a wide variety of educational software. Write for catalog.

On September 4-6, 1985, the Fourth Annual Working Women's Exposition will be held at the Radisson Hotel in Denver, Colorado. The Working Women's Exposition was created to provide an opportunity for people to gather and share information about their goals and needs. Participants at the Expo attend "how-to" seminars and workshops, and in 1985 can earn Continuing Education Units to further their career training. In 1984, there were 120 programs presented by 100 qualified trainers.

Women's Studies, Sage Publications, Inc., P.O. Box 5024, Beverly Hills, CA 90210.

Women's Studies, Greenwood Press, 88 Post Road West, Box 5007, Westport, CT 06881.

DEADLINES: Sept. 24 for Nov.-Dec., Nov. 24 for Jan.-Feb., Jan. 24 for Mar.-Apr.

AD DEADLINES: Oct. 5 for Nov.-Dec., Dec. 5 for Jan.-Feb., Feb. 5 for Mar.-Apr.

ADDRESSES: Send all Newsletter material **except ads** to Anne Leggett, Dept. of Math. Sci., Loyola University, 6525 N. Sheridan Rd., Chicago, IL 60626.

Send everything else, **including ads**, to AWM, Box 178, Wellesley College, Wellesley, MA 02181.

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University of California, Berkeley. Dept of Mathematics, Berkeley, CA 94720.

Subject to budgetary approval position of Assoc. or Full Professorship available 7/1/86 in areas of algebra, analysis, applied mathematics, foundations or geometry. Required: substantial achievements in research & teaching. By 9/30/85 send curriculum vitae, list of publications, a few selected reprints or preprints & names of 3 references to Vice Chair for Faculty Appts.

University of California, Davis. Dept of Mathematics, Davis, CA 95616. One or more tenure track positions effective 7/1/86. Broad background in one of the following areas: 1. Functional Analysis and Partial Differential Equations; 2. Dynamical Systems and the Geometric Theory of Differential Equations. Positions will be filled at Assistant Professor level and require Ph.D. in mathematics or closely related field and evidence of achievement or potential in research and teaching. By 1/13/86 send application, vita & names only of 3 referees to Chair, Search Committee, at above address.

University of California, Los Angeles. Dept of Mathematics, Los Angeles, CA 90024. Yiannis N, Moschovakis, Chair . (1) Three or four regular positions in pure mathematics. Preference will be given to candidates in number theory (including modular forms) and probability (including statistical mechanics). Other fields of particular interest include analysis, geometry/topology, differential equations, and algebra (especially representation theory). Very strong research & teaching background required. Positions initially budgeted at the Asst. Prof. level. Will consider sufficiently outstanding candidates at higher levels in other fields. Teaching load: Five quarter courses per year. (2) Three or four regular positions in applied and computational mathematics. Prefer candidates in numerical analysis, mathematical modeling, and scientific/engineering computing. Very strong research & teaching background required. Positions initially budgeted at Asst. prof. level. Sufficiently outstanding candidates at higher levels and/or in other fields will also be considered. Teaching load: Five quarter courses per year. (3) One or two positions in mathematical computer science. Preference will be given to candidates in analysis of algorithms, coding theory, computational complexity, and the theory of programming languages. Very strong research & teaching background required. Positions initially budgeted at the asst. prof. level. Sufficiently outstanding candidates at higher levels and/or in other fields will also be considered. Teaching load: Five quarter courses per year. (4) Temporary Positions. One or two E. R. Hedrick Asst. Professors. Applicants must show strong promise in research & must have received the Ph.D. during the past 3 or 4 years (but may be of any age): no restrictions as to field; anticipated salary \$33,400. Three year appt: research supplement of \$3,700 first summer. Teaching load: Four quarter courses per year, which may include one advanced course in candidates' field. Deadline for applications is 1/1/86. Also a few adjunct asst professorships; two year appt; strong research & teaching background; no restriction as to field. Anticipated salary \$28,700 for academic year. Teaching load: Five quarter courses per year. Also several positions for visitors & lecturers. For all positions apply to Chair.

University of Colorado, Boulder. Dept of Mathematics, Box 426, Boulder, CO 80309. Asst Professorships available Fall, 1986. Also welcome strong applications for Assoc. Professorships. Prefer candidates whose research complements interests of current faculty. Salary range: \$24,000 to \$35,000. By 11/1/85 apply to New Appointments at above address.

Purdue University. Dept of Mathematics, West Lafayette, IN 47907. M. S. Baouendi, Head. (1) Several tenure track or research asst. professorships 8/1986. Required: exceptional research promise & excellence in teaching. (2) Possibly one position at Assoc. Prof./ Prof. level 8/1986. Required: excellent research credentials. For all positions send resume & 3 letters of recommendation to Head.

University of Kansas. Dept of Mathematics, Lawrence, KS 66045-2142. C.J.Himmelberg, Chmn. Tenure track & temporary positions at all levels, starting 8/16/86 or as negotiated. Prefer numerical analysts, but will consider candidates in other applied areas related to those represented in Dept. Require Ph.D. or Ph.D. dissertation accepted with only formalities to be completed. Send application, detailed resume with description of research & 3 recommendation letters to Chmn. Deadlines: 11/1/85 for first consideration, then monthly until 8/1/86.

University of Minnesota, Minneapolis. School of Mathematics, Minneapolis, MN 55455. The Board of Governors of the Institute of Mathematics and Its Applications (IMA) and the University of MN seek a new Director of IMA. New Director will be offered a Professorship in School of Math at Univ of MN. Required: Qualifications to provide scientific & administrative leadership to the IMA. Required: distinguished academic credentials & record of scientific leadership. Salary & term as Director negotiable.

University of Minnesota, Minneapolis (contd)

Send nominations and applications to Prof. Frederick Gehring, Chair, IMA Director Search Committee, Dept of Mathematics, University of Michigan, Ann Arbor, MI 48109 by 1/15/86.

University of Minnesota, Duluth. Dept of Mathematical Sciences, Duluth, MN 55812.

Full Professorship 9/1/86. Salary competitive commensurate with experience and qualifications. Duties: teach 6-10 hrs/wk grad & undergrad math & comp sci; help develop MS in CS & applied math. Conduct research in CS, math & applications thereof. Qualifications: Ph.D. in math or CS; 10 years teaching theoretical & applied math and CS at both grad & undergrad levels; experience directing masters' theses in math & CS; refereed publications in math & CS. Send application, resume & 3 letters of recommendation to Professor Sabra Anderson at above address by 9/15/85.

Rutgers University, Newark. Dept of Math & Computer Science, Smith Hall, Newark, NJ 17102 Jane Gilman, Chair. Full Professorship 7/1986. Candidates should exhibit strong research accomplishments. Teaching load & salary negotiable. Send curriculum vitae & names of 3 references to Chair.

Bard College. Dept of Mathematics, Annandale-on-Hudson, NY 12504. New tenure track position Fall, 1986. Required: strong commitment to undergraduate teaching coupled with plans for continued research. Ph.D. required, but will consider attractive candidates about to receive the Ph.D. Need help in forwarding an innovative math program at Bard. By 11/15/85 send resume & 2 letters of recommendation to Professor Peter R enz at above address.

SUNY - Buffalo. Dept of Mathematics, 106 Diefendorf Hall, Buffalo, NY 14214. Dr. Jonathan Bell, Search Committee Chmn. At least one Asst. Professorship 9/1/86. Salary competitive. Will consider applicants in all fields of math, but prefer those in algebraic/geometric topology, numerical analysis/applied math, differential geometry/Lie Groups/harmonic analysis, and ring/module theory. We seek applicants with high research potential & strong commitment to teaching. By 12/1/85 send credentials & 4 letters of recommendation to Dr. Jonathan Bell, Search Committee Chmn.

University of North Carolina, Chapel Hill. Dept of Mathematics, Chapel Hill, NC 27514. (1) Tenure track & visiting faculty positions, pending Dean's approval, Fall, 1986. Rank & salary dependent on qualifications & budget consideration. Required: strong research program & commitment to excellent teaching. Prefer candidates in areas of computational & applied mathematics. By 1/15/86 send 4 letters of recommendation, vitae, & abstract of current research to Chmn, Math Dept. (2) University Distinguished Professor of Mathematics. Required: record of excellence in research, demonstrated commitment to excellent teaching & ability to provide scientific leadership. Prefer senior candidates in areas of partial differential equations or in areas of computational and applied mathematics. Send application, vitae & names of at least 4 references to Chmn., Math Dept.

Ohio State University. Dept of Mathematics, 231 W 18th Ave, Columbus, OH 43210. Several positions at all ranks, both visiting & permanent, Fall, 1986. Prefer candidates in areas of applied & pure mathematics. Expect significant research accomplishments, exceptional research promise & evidence of good teaching from successful applicants. Please send credentials & have letters of recommendation sent to Prof. Alan Woods at above address.

Office of Naval Research, Arlington, VA 22217-5000

Two Civil Service positions at the GM-14 or GM-15 (\$44,430 - \$67,940) level are available: (1) Mathematician (Announcement #85-51) Duties: to formulate, implement, and monitor a contract research program in discrete mathematics & related algebraic methods (including combinatorics, graph theory, enumeration, discrete optimization, finite ordered sets, and combinatorial designs). (2) Mathematical Statistician (Announcement #85-52) Duties: to formulate, implement, and monitor a contract research program in the area of mathematical & computational statistics & probability (including asymptotic theory, small sample theory, robustness, design of experiments, multivariate analysis, applied probability, stochastic processes, stochastic differential equations, statistical computing, and simulation). Applicants must have a Ph.D. or equivalent and one year of experience or 3 years of progressively responsible professional experience. Submit a resume or Standard Form 171 to be received by 11/15/85 to: Office of Naval Research, Civilian Personnel Division, Code 791SC, Attn: Announcement #85-51 or #85-52 (AWM), 800 North Quincy Street, Arlington, VA 22217-5000. For further information or supplemental forms call (202) 696 4705.

Michigan State University. College of Natural Science, East Lansing, MI 48824

Dean, College of Natural Science. College of Natural Science consists of 19 academic units and programs in the physical, biological & mathematical sciences. The College maintains programs of instruction, research & public service both on and off campus. The Dean of the College of Natural Science is the chief executive officer of the College and is responsible to the Provost and the President for the general administration of the College. Required: Ph.D. or its equivalent & evidence of strong accomplishment in scientific research and in administrative leadership. Candidates must meet standards for appointment at rank of professor (with tenure) in an academic department in the College. Position will start 7/1/86 or as soon as possible thereafter. By 11/1/85 send nominations and applications to:

Dr. James Bath
Chairperson, Search & Rating Committee
Dean of the College of Natural Science
c/o Office of the Provost
436 Administration Bldg.
Michigan State University
East Lansing, MI 48824

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