

AWM

ASSOCIATION FOR WOMEN IN MATHEMATICS

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NEWSLETTER

May–June 2004

PRESIDENT'S REPORT

The energy at our recent workshop "After Tenure: Women Mathematicians Taking a Leadership Role" was electric. Thirty "junior" participants (mostly recently tenured faculty) and a dozen "senior" participants discussed leadership from many different angles. Panel discussions addressed leadership within one's department (in particular, how to be an effective department chair), leadership in research and the professional societies, and the pros and cons of taking on leadership positions. Please watch for excerpts from these discussions in upcoming newsletters. Through the use of fascinating case studies, we brainstormed on many types of issues such as how to handle inappropriate remarks in letters of recommendation for job candidates. Lloyd Douglas, Deborah Lockhart, and Henry Warchall of the National Science Foundation and Rosalie (Jackie) Smith and Michelle Wagner of NSA shared information about funding opportunities. Discussion groups addressed various leadership issues. Though I was one of the panelists myself, I learned far more from the other participants than I shared. How inspiring it was to see so many young women mathematicians who are already moving into leadership positions in their departments or in the profession with remarkable skill and sensitivity! Many thanks to organizers (and panelists) Ruth Charney, Rebecca Herb and Gail Ratcliff, to senior participants Lenore Blum, Joan Feigenbaum, Raymond Johnson, Magnhild Lien, Caroline Melles, Elsa Schaefer, Tina Straley, and Jean Taylor. Thanks also to AWM staff members Dawn Wheeler and Muriel Daley whose attention to every detail made the weekend flow so smoothly. We thank the National Science Foundation and the University of North Texas for their support of the workshop and the University of Maryland for serving as host.

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One of the final events of the workshop was a very inspiring lecture by Lenore Blum on the dramatic changes in the computer science department at Carnegie Mellon University, where the percentage of female majors jumped from 7% to 38% as admissions criteria were changed to emphasize diverse interests and high academic achievement and de-emphasize prior

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MATHEMATICS

The Association was founded in 1971 at the Joint Meetings in Atlantic City. The purpose of the association is to encourage women and girls to study and to have active careers in the mathematical sciences. Equal opportunity and the equal treatment of women and girls in the mathematical sciences are promoted.

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The Editor welcomes articles, letters, and announcements.

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programming experience (the latter having been shown not to be a predictor of success). At Blum's website www-2.cs.cmu.edu/~lblum/, you will find links to fascinating articles by her and Carol Frieze describing the changes at Carnegie Mellon and their implications.

The workshop also gave us the opportunity to remember and celebrate the life of Ruth Michler (see her biography in the January–February 2001 issue of the *AWM Newsletter*). We were delighted that Ruth's father, Dr. Gerhard Michler, joined us for the weekend. Michaela Vancliff shared her memories of how Ruth energized mathematicians from several universities to come together for seminars, and Lenore Blum shared a delightful story of Ruth as a graduate student enthusiastically climbing over chairs to get a front seat in the Berkeley colloquium.

We announce a change in the AWM Executive Committee. Judy Walker, member-at-large, has stepped down due to new responsibilities both professionally and personally. We thank her for her substantial contributions to the AWM and wish her the best in her new endeavors. We are pleased that she will still be very actively involved in the AWM as a co-organizer of the Workshop for Women Graduate Students and Recent Ph.D.'s next January. The Executive Committee is delighted to welcome Helen Moore, Associate Director of the American Institute of Mathematics, who will complete Judy's term.

AWM has many activities planned this summer. At the SIAM Annual Meeting, Joyce McLaughlin (Rensselaer Polytechnic Institute) will give the second annual AWM-SIAM Kovalevsky Lecture, "Interior Elastodynamics Inverse Problems: Creating Shear Wave Speed Images of Tissue." Also at the SIAM Annual Meeting, the AWM will hold a Workshop for Women Graduate Students and Recent Ph.D.'s, supported by the Office of Naval Research and the National Security Agency and organized by Suzanne Lenhart and Elsa Schaefer. All are invited to the workshop activities.

At the MathFest this summer, Bozena Pasik-Duncan (University of Kansas) will deliver the AWM-MAA Lecture entitled "Mathematics Education of Tomorrow." The AWM will also host a reception for all MathFest attendees.

We wish all of you a pleasant and productive summer.



Carolyn Gordon
Dartmouth College
March 25, 2004



AWM ESSAY CONTEST

Victoria Howle, Sandia National Labs

To increase awareness of women's ongoing contributions to the mathematical sciences, AWM and Sandia National Labs sponsored the third annual essay contest on biographies of contemporary women mathematicians and statisticians in academic, industrial, and government careers. The grand prize winner, ESTHER FELDBLUM, Maimonides School, Sharon, MA, was announced in the president's report last issue. Congratulations again to Esther, whose essay, "Dr. Harpreet Chowdhary: The Mathematician as Executive," was first among more than 125 essay submissions.

First Place in the college category went to "Elizabeth Stanhope: Overcoming Silent Barriers," JESSICA JOHN, Willamette University, Salem, OR. FELDBLUM was the first-place winner in the grades 9–12 category; honorable mentions went to "Dr. Marsha Davis: Defying Statistics," SARAH TRACY, Notre Dame Academy, Sturbridge, MA, and "An Accomplished Woman in Mathematics: Dr. Evelyn Silvia," AMBER DURRELL, Loretto High School, Auburn, CA. In grades 6–8, First Place was earned by "I Seek an Answer to the Question 'Why?'"—Dr. Helen Moore," SERGEI SHUBIN, Joaquin Miller Middle School, San Jose, CA. Honorable mentions went to "When Flexibility is the Rule—Dr. Magnhild Lien—A Biographical Essay," CHRISTIE

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 Friend: \$1000 Benefactor: \$2500
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 See the AWM website for details.

Subscriptions and back orders

All members except family members receive a subscription to the newsletter as a privilege of membership. Libraries, women's studies centers, non-mathematics departments, etc., may purchase a subscription for \$50/year (\$58 foreign). Back orders are \$6/issue plus shipping/handling (\$5 minimum).

Payment

Payment is by check (drawn on a check with a US branch), US money order, or international postal order. Cash payment will be accepted if necessary, but only in US currency.

Newsletter ad information

AWM will accept advertisements for the *Newsletter* for positions available, programs in any of the mathematical sciences, professional activities and opportunities of interest to the AWM membership and other appropriate subjects. The Director of Marketing, in consultation with the President and the Newsletter Editor when necessary, will determine whether a proposed ad is acceptable under these guidelines. *All institutions and programs advertising in the Newsletter must be Affirmative Action/Equal Opportunity designated.* Institutional members receive discounts on ads; see the AWM website for details. For non-members, the rate is \$100 for a basic four-line ad. Additional lines are \$6 each. See the AWM website for *Newsletter* display ad rates.

Newsletter deadlines

Editorial: 24th of January, March, May, July, September, November

Ad: 1st of February, April, June, August, October, December

Addresses

Send all *Newsletter* material **except ads and material for book review and education columns** to Anne Leggett, Math Dept., Loyola University, 6525 N. Sheridan Road, Chicago, IL 60626; email: leggett@math.luc.edu; phone: 773-508-3554; fax: 773-508-2123. Send all **book review** material to Marge Bayer, Math Dept., University of Kansas, 405 Snow Hall, 1460 Jayhawk Boulevard, Lawrence, KS 66045-7523; email: bayer@math.ukans.edu; fax: 785-864-5255 and all **education column** material to Ginger Warfield, Math Department, University of Washington, Seattle, WA 98195; email: warfield@math.washington.edu. Send everything else, **including ads and address changes**, to Dawn V. Wheeler, 4114 CSS Building, University of Maryland, College Park, MD 20742-2461; phone: 301-405-7892; email: awm@math.umd.edu.

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AWM-Net

To subscribe, send mail to awm-net-request@cs.umd.edu and include your email address; AWM members only.

AWM DEADLINES

NSF-AWM Travel Grant: May 1, 2004
and October 1, 2004

Michler Collaborative Research Grants:
May 1, 2004

Sonia Kovalevsky High School
Mathematics Days: August 4, 2004

AWM Workshop, January 2005:
September 1, 2004

Schafer Prize, January 2005:
October 1, 2004

Hay Award, January 2005:
October 1, 2004

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ONZOL, Nobel Middle School, Northridge, CA, and "Shapes with No Boundaries: The Life of Krystyna Kuperberg," MAJA WICHROWSKA, Northwestern Middle School, Alpharetta, GA.

The grand prize essay appears below. All the winning essays may be found on the AWM website at www.awm-math.org/biographies/contest/2003.html.

Thanks to all of the students who participated and to all the interviewees and volunteers who helped make the contest a success.

Dr. Harpreet Chowdhary:* The Mathematician as Executive

Esther Feldblum, Maimonides School, Sharon, MA

Harpreet Chowdhary is a woman of Sikh background whose family comes from a small town in the Punjab (Northern India). She was born in England, grew up in Canada, and did her doctoral work at the University of Wisconsin-Madison with a dissertation on "Infinite Bump Solutions to Semi-Linear Elliptic Schroedinger Equations." After she married a fellow mathematician, they moved to Boston, where she now works as a research actuary at the largest workers' compensation insurer in the country. She is responsible for the insurance pricing models used in her company; she has written or co-authored several papers on actuarial science; and she teaches the Advanced Dynamic Financial Analysis seminar for the Casualty Actuarial Society, the national society of actuaries.

Until recently, executives of insurance companies were men, and even now women must prove their worth as corporate officers, sometimes foregoing having children while they work additional hours at their companies. Women are often judged by their willingness to conform, whether to the golf and club events of their male colleagues or to the high heels and business attire of their firm.

But Dr. Chowdhary does not conform to her company; her company conforms to her. When I met her in her office, she was wearing modest trousers, a sweater, and comfortable shoes; there was not a trace of the sharp styles associated with the corporate dress code. As the mother of a three-year-old daughter, and expecting another child, Dr. Chowdhary works half the week in the office and the other half from home. Her husband has a similar arrangement, and they share the child-raising duties and household tasks.

As a postdoctoral fellow at Dalhousie University in Halifax, Nova Scotia, Dr. Chowdhary lectured in mathematics for two years. She developed the skill of making abstruse concepts understandable even to students with little mathematical background. She enjoys teaching and research, but she wanted the opportunity to apply sophisticated mathematics to complex business problems, leading to her second career as an actuary.

* Name changed at the request of the interviewee.

One thinks of actuaries as insurance accountants: looking up values in tables and calculating premiums, accident frequencies, or mortality rates. But Dr. Chowdhary does not enter values into models, she builds the models that other actuaries use. She applies her knowledge of stochastic differential equations to build financial models of an insurance company's operations, including the random loss fluctuations of auto accidents and workers' compensation injuries, the Brownian motion of stock prices and interest rates, and the uncertainties of medical inflation and business cycles.

Over this past year, Dr. Chowdhary has co-authored a series of papers on insurance pricing models, which she is now turning into a textbook for casualty actuaries. She has been explaining insurance pricing to the other officers of her firm, and she has been traveling to actuarial conventions and seminars to give presentations on financial pricing, capital allocation, and performance measurement.

Twenty years ago, advanced mathematics would have been of little use to the practical businesswoman. When companies built models of future stock prices, bond prices, and inflation rates, they sought the economic causes of future changes. Inflation may reflect an oil shortage, excessive government spending, or an infusion of money into the economy by the Federal Reserve Board. Companies sought economists who might predict movements of inflation rates and interest rates by their expertise in economic causes.

But economic models have limited value; even when they predict just the direction of inflation rate movements, economists are right only half the time. Stock prices, interest rates, and inflation rates are now thought to follow random walks: unusual movements which are random and cannot be predicted. Theoreticians now model stock prices and interest rates as stochastic diffusion processes, much like the Brownian motion of gases within a closed container.

Brownian motion is best modeled by stochastic differential equations, and Dr. Chowdhary's expertise in this subject has enabled her to form models of insurance companies and the insurance industry. She builds her models with a combination of Excel spreadsheets and more sophisticated simulation software. Her presentations show the probabilities of different outcomes in a variety of scenarios. As the software becomes more complex, her expertise becomes even more valuable.

Teaching mathematics to graduate students is

different from explaining mathematical models to corporate officers. Mathematicians prize elegant proofs; they especially value results that are not intuitive but are logically correct. A university lecture must be sound; simplifications that leave out essentials are not appropriate; visual aids and graphics are sometimes distractions. But a corporate presentation must be intuitive and the application must be useful; simplifications are essential, as are visual aids and graphics that help the audience grasp the concepts. Above all, Dr. Chowdhary strives never to appear as though she knows more than her audience, who are often the executive officers of the company.

Although Dr. Chowdhary was determined to be a mathematician, and no stereotypes could limit her ambition, other women immigrants from traditional cultures were often discouraged. Sikhs have formed small, family-owned businesses wherever they have emigrated, but few Sikhs (and very few Sikh women) have risen as prominently as Dr. Chowdhary has in the US insurance industry.

Dr. Chowdhary's mathematical skills have propelled her to prominence in her career. She encouraged me to strive for excellence in my studies, never to relinquish my love of math, and to apply even complex subjects to real world problems. The actuarial career is wonderful for mathematicians; as she says, "What other business career gives one an opportunity to use differential equations?" She has shown me that a mathematician can succeed without giving up anything as a woman, a mother, or a human being.

About the author: My name is Esther Feldblum, and I am a senior at Maimonides School in Brookline, MA. I am fascinated by all mathematics (from algebra to trigonometry to calculus), but my particular interests lie in economic analysis and the application of statistics (although no courses are offered in these subjects at my school). I have always wondered how a future degree in mathematics can be turned into a successful business career; my interview with Dr. Chowdhary provided a wonderful incentive for pursuing my mathematical interests.



ON THE DIVERSE PERSONAL LIVES OF MATHEMATICIANS

Christina Sormani, Lehman College, CUNY

This past January, the AWM held a panel to discuss the many different personal issues that affect the lives and careers of mathematicians. This panel was organized by Carolyn Gordon, Marianne Korten, Helen Moore and Christina Sormani. Our panelists were Cleopatria Martinez, Mary Elizabeth Bradley, Jerome Dancis and Liz Stanhope. There is also an extensive and growing web forum on the topic to which we invite everyone to contribute by asking questions, posting their own stories and volunteering to be interviewed by email: <http://comet.lehman.cuny.edu/sormani/AWM/forum2004.html>. We expect to post the complete transcript for the January panel discussion at this website as well.

The key questions we have asked are:

- In what ways has your personal life affected your career as a mathematician and how did you choose to deal with it?
- In what ways could/did your department/institution provide support? In what ways could the mathematics community provide support?

We hope both *to effect change* in the mathematics community and *to provide role models* for each other. We hope the stories will both inspire those with similar experiences and educate those who have lead very different lives.

The first panelist to speak was Liz Stanhope, who spoke as a representative of the LGBT (Lesbian/Gay/Bi/Trans) community. She discussed conducting a job search that openly disclosed her sexual preference and her assessment of whether an academic community would welcome her as a woman with a female partner. "On-campus interviews were a problem because I very much wanted to ask, 'Oh, so can you help me speak with some one who might know what it might be like to be a queer person living in this town or working in this department?'" and I never felt comfortable asking that question."

At the end of the forum, similar concerns were brought up by audience members, particularly concerns about having a spouse of another race. A transsexual has posted on the web forum and voiced concerns about health insurance. A parent may wish to ask about

daycare without leading into questions about whether they have children or expect to have them soon. Even when there isn't a question of privacy, a job candidate may wish to speak to someone who has more knowledge than the math department's hiring committee has.

In response, AWM president, Carolyn Gordon, has asked all members of the AWM to encourage their universities and departments to provide contact numbers for people who are interviewing. The list of contacts would include people who could discuss LGBT issues, various ethnic/religious concerns, handicapped access, safety, parenting (including onsite daycare and local schools), health care (including mental health and fertility/adoption coverage) and other topics. Ideally candidates would be given an hour of free time during their campus visits so they could explore or meet privately with one of these contacts. Anyone who would like to recommend contacts to include on this list, please post your suggestions on the web forum. We want to be as inclusive as possible.

Cleopatria Martinez opened her speech with the following provocative question: "I'm just curious: is anybody out there a Latino?" No one responded. "And this is the story of my life! I don't remember when I've ever been in a room with another Latino in mathematics and I've been in mathematics over 30 years."

She then explained how she advanced to become chair of her department. It began when she was a single mother supporting her children through college. She went to her chair to ask about becoming the "evening chair" to earn more money: "And my department chair said that he didn't think I should be evening department chair because that was a stepping stone to the department chair. He was sitting across the table from me and he said, 'You don't have what it takes.' And I thought, you know, that's really blunt.... I just thought, no, he didn't say that, this is my colleague, this is the 21st century. I finished the conversation and later I got really mad and when the time came to run for department chair I went ahead and submitted my name."

Martinez can be a role model for all of us!

She also discussed how frequently people assume she can't do her job: "I had a student who had trouble with fractions. So I asked my colleague, How do you teach this kind of fraction? She began to talk to me as though I

didn't know fractions, and I had a Ph.D. and she didn't!" Students also have had a tendency to disrespect her, so she's learned to walk into her classes and give a list of her credentials, including where she's worked. (This technique came in handy for me when I taught an all-male class.) On the other hand, she warned us not to intimidate our students with this, especially if you have a class that knows you've earned your right to teach them.

Mary Elizabeth Bradley spoke next about the difficulties of having a child who needed a heart operation and has Down Syndrome. She strongly pushed for a full semester's worth of maternity leave both for the sake of the new parent and for the sake of the students. She went to her dean's office and successfully extended her six-week FMLA to the entire semester so she could care for her deathly ill infant. Later her department was very helpful in covering her classes at the time of the heart surgery. "I would gladly give up any prestige and go to any institution to have the support to know that my family comes first, and not to have to compromise things there, for my work." It is Bradley's sense of determination and this willingness to leave that makes universities and the administration realize just how much they do value you and work to accommodate your needs.

While Bradley was tenured already when her child underwent surgery, others may still be looking for a permanent position. One question that was asked at the panel was: "To what extent can you expect a search committee to say this person has a real serious family problem, let's hire them and help them?"

Bonnie Shulman, who was in the audience, fielded the question: "Somebody, for instance, who is a single parent or has a special needs child or, as we were talking about, family responsibility, has an understanding, an empathy, a sympathy, a perspective, for many of our students, that many of us who may not have been in a [similar] situation can't provide." She added, "Most of you would also agree that if we want to get anything done, give it to a busy person, and somebody who is used to organizing their life around these things can often be a very effective contributor and worker."

Our moderator Helen Moore remarked that an interviewer cannot legally ask these questions at an interview. However, it is understandable that someone might wish to be open about their family or an illness for the same reasons that Stanhope was, or because they feel the need to explain a research or work gap on their vitas.

Thomas Bieske, a contributor on the web forum,

mentioned his open-heart surgery on his C.V. when applying for jobs to explain his lagging research program. He is still unsure as to how search committees reacted to that note. If anyone can provide feedback as someone who saw mention of illness on a cover letter or C.V., this would be very welcome. An anonymous contributor to the web forum writes that he had a brain tumor, yet subsequently found a job and reestablished his research despite a lingering fear of permanent brain damage. Anyone who needs advice about restarting a research program after a serious illness is recommended to consult his posting and may contact him through the forum moderator. There is also a posting about a difficult pregnancy that required bed rest.

Jerome Dancis, the last panelist to speak, discussed the loss of his wife and the experience of being a single parent of three children. He focused on the time and effort involved in supervising his children's education. This has inspired him to write numerous articles and opinion pieces on K-12 math education, some of which have been published in the *Washington Post*. He has strongly opposed Maryland's "Pretend Algebra and Pretentious Data Analysis Exam" and has spoken before the Maryland Board of Education against the even weaker exams being used to certify middle school teachers in his state.

The web forum has a posting by an anonymous single mother who lost her partner early in her mathematics career. She wrote about a few key mathematicians who helped her recover from the loss and subsequent hiatus from her research by sending her invitations to conferences, offers of visiting positions and funding from their grants to help her continue her own research. She had help from powerful people who respected her earlier research, but even us ordinary mathematicians can rescue our colleagues in a time of stress.

If we know anyone whose research we followed but who subsequently disappeared, we can find them and bring them back into our research groups by inviting them to speak or offering them visiting positions. If there is a colleague in one of our departments who has been ill or overwhelmed by family responsibility or tragedy, we can give them time to recover. We can grant them a leave, stop the clock if they are tenure track or, if not, extend their temporary appointment by a year. Then we can ease them back into research by inviting appropriate colloquium speakers, giving them the opportunity to visit another university or hiring a faculty member or

postdoc with whom he/she can work. At the very least we can offer to cover classes or grade exams for colleagues who are in need.

We can also do more to help each other feel welcome. Sometimes one has to learn a little more about someone else's personal life to be more welcoming to them. There are postings by people of various ethnicities (including Chinese and Jewish mathematicians) discussing little things people can do that would make them feel more comfortable in their departments: Holidays can be remembered. People can invite each other out to lunch. Chairs can take faculty aside and ask how things are going. Annual reviews can be encouraging. Departments can provide training in teaching and ESL. Advisors can champion their students. In fact, there are two wonderful stories on the web forum of advisors supporting their students through difficult times and decisions. We welcome more.

The panel was only able to touch the tip of the iceberg. We hope that by joining together on the web forum discussion, more ideas will come forth and more people will be inspired to overcome their own difficulties. We need not have the same personal lives to support each other. We do, at the very least, have a rare common bond: a love of mathematics. We shouldn't forget that we can help each other pursue this love.

We are particularly interested in postings by people who've dealt with divorce, especially involving location issues, stepchildren and depression. This is a very common problem, and we have not yet found anyone willing to post on the topic. We would also like to hear from mathematicians of all ethnicities/religions/races, as so far we have only four postings in that area. Anyone who has anything to say about something they have felt has affected their career as a mathematician, please feel free to post or ask for an email interview.

SONIA KOVALEVSKY HIGH SCHOOL MATHEMATICS DAYS

Through grants (*pending final funding approval*) from Elizabeth City State University and the National Security Agency (NSA), the Association for Women in Mathematics expects to support Sonia Kovalevsky High School Mathematics Days at colleges and universities throughout the country. Sonia Kovalevsky Days have been organized by AWM and institutions around the country since 1985, when AWM sponsored a symposium on Sonia Kovalevsky. They consist of a program of workshops, talks, and problem-solving competitions for high school women students and their teachers, both women and men. The purposes are to encourage young women to continue their study of mathematics, to assist them with the sometimes difficult transition between high school and college mathematics, to assist the teachers of women mathematics students, and to encourage colleges and universities to develop more extensive cooperation with high schools in their area.

AWM anticipates awarding 12 to 20 grants ranging on average from \$1500 to \$2200 each (\$3000 maximum per school) to universities and colleges. Historically Black colleges and universities are particularly encouraged to apply. Programs targeted toward inner city or rural high schools are especially welcome.

Applications, not to exceed six pages, should include: a) a cover letter including the proposed date of the SK Day, expected number of attendees (with ethnic background, if known), grade level the program is aimed toward (e.g., 9th and 10th grade only), total amount requested, and organizer(s) contact information; b) plans for activities, including specific speakers to the extent known; c) qualifications of the person(s) to be in charge; d) plans for recruitment, including the securing of diversity among participants; e) detailed itemized budget (i.e., food, room rental, advertising, copying, supplies, student giveaways, etc. Honoraria for speakers should be reasonable and should not, in total, exceed 20% of the overall budget. Stipends and personnel costs are not permitted for organizers. This grant does not permit reimbursement for indirect costs or fringe benefits. Please itemize direct costs in budget.); f) local resources in support of the project, if any; and g) tentative follow-up and evaluation plans.

The decision on funding will be made in late August. The high school days are to be held in Fall 2004 and Spring 2005. If selected, the organizer(s) must submit a report of the event along with receipts (originals or copies) for reimbursement to AWM within 30 days of the event date or by June 1, 2005, whichever comes first. Reimbursements will be made in one disbursement; no funds can be disbursed prior to the event date. An additional selection cycle will be held February 4, 2005 for Spring 2005 *only if funds remain after the August 2004 selection cycle.*

Send *five* complete copies of the application materials to: Sonia Kovalevsky Days Selection Committee, Association for Women in Mathematics, 4114 Computer & Space Sciences Building, University of Maryland, College Park, Maryland 20742-2461. For further information: phone 301-405-7892, email awm@math.umd.edu, or visit www.awm-math.org. Applications must be received by **August 4, 2004**; applications via email or fax will not be accepted.

EXPERIENCES FROM A RESEARCH TEAM RESIDENCY AT THE ROCKEFELLER FOUNDATION'S BELLAGIO CENTER

Anna Nagurney, Department of Finance and Operations Management, Isenberg School of Management, University of Massachusetts, Amherst, MA 01003; Patrizia Daniele, Department of Mathematics and Computer Science, University of Catania, Catania, Italy, and Monica Gabriela Cojocaru, Department of Mathematics and Statistics, University of Guelph, Guelph, Ontario, Canada

From March 10th through March 23rd, 2004, we were in residence at the Rockefeller Foundation's Bellagio Study and Conference Center located in Bellagio on Lake Como in northern Italy. The Bellagio Center opened in 1959 to allow scholars, scientists, artists, writers, as well as policy-makers and practitioners from around the globe, to pursue their research and creative work. Its setting is idyllic with views of Lake Como and the Alps, coupled with magnificent gardens and parks. The beauty of the setting, the support that we received, the rewarding interactions with other scholars outside our disciplines and the musicians, artists, and writers that were in residence during our stay provided us with a truly unique and exceptional environment in which to pursue our research project.

The title of our team project was "Dynamics of Complex Networks in an Environment of Risk and Uncertainty: Theoretical Foundations and Applications to Global Supply Chains and International Financial Networks." We were the 152nd research team in the Center's history since research teams were first invited to the Center in the late 1990s. Our proposal had been submitted over a year earlier in response to a letter of invitation that Nagurney received following her tenure as Fulbright Distinguished Chair in Innsbruck, Austria in Spring 2002.

The research team consisted of Patrizia Daniele, Monica Gabriela Cojocaru, and Anna Nagurney. Patrizia Daniele was born in Sicily and received her bachelor's degree from the University of Catania and her doctorate in Applied Mathematics and Computer Science from the University of Naples in 2000. In 1996, she was awarded the Gioacchino Iapichino Award by President Oscar Luigi Scalfaro of Italy, after a national competition, for

one of her papers on variational inequalities [Daniele 1994]. Patrizia is an associate professor of operations research at the University of Catania.

Monica Cojocaru was born in Romania and received her bachelor's and master's degrees in mathematics from the University of Bucharest. She received her doctorate in mathematics from Queen's University in Kingston, Ontario, in 2002 and was an NSERC postdoctoral fellow at the Centre des Recherches Mathématiques in Montreal. In 2003, Monica won the NSERC University Faculty Award competition for the assistant professor position that she presently holds at the University of Guelph.

Anna Nagurney is the John F. Smith Memorial Professor at the University of Massachusetts. She received her doctorate in applied mathematics with a specialty in operations research from Brown University. Among the awards that she has received are: the Kempe Prize from the University of Umea, Sweden; an NSF Visiting Professorship for Women and a Faculty Award for Women; an Eisenhower Faculty Fellowship; and two AT&T Industrial Ecology Fellowships.

The three research team members were greeted at the Milan airport on March 10 and were driven to the Bellagio Center (a ride of about two hours). While at Bellagio, we stayed at our own minivilla, which was set up for our use and provided us with access to laptops, Internet connections, a white board and a printer. Our research interests and backgrounds created an incredible synergy through which we could conduct our research project. Although we had interacted through email, only Patrizia and Anna had ever met face to face, but we knew each other through our research interests and publications. Monica Cojocaru was the "purest" mathematician in the group. She had established results critical to the success of the project in her thesis and subsequent publications [Cojocaru 2002; Cojocaru and Jonker 2003]. In particular, she had generalized some of the results of Dupuis and Nagurney [1993; see also Nagurney and Zhang 1996] in projected dynamical systems to Hilbert spaces. Patrizia Daniele, in turn, had been working on evolutionary variational inequalities. She had developed time-dependent analogues of some of the traffic network, spatial price equilibrium, and financial



Monica Cojocaru, Patrizia Daniele, and Anna Nagurney

equilibrium models [Daniele, Maugeri, and Oettli 1998; Daniele 2002 and 2003] that Nagurney had formulated and studied (with students and co-authors) as finite-dimensional variational inequality problems [see Nagurney 1993 and 2000, Nagurney and Siokos 1997, and the references therein].

From the first day of our residency, we established a rhythm that enabled us to work intensively from early in the morning until very late at night. In addition, we took part in some incredible and very memorable intellectual conversations and discussions during the meals as well as the evening seminars. For the most part, we worked together in the conference room of our villa, brainstorming, questioning, connecting, researching the existing literature, marking up the white board with equations and diagrams, and establishing our results. Our primary goal was to build the theoretical foundations through the connections (and unification) of projected dynamical systems and evolutionary variational

inequalities on Hilbert spaces. From the former, we could then gain powerful computational procedures, whereas from the latter we could gain a new richness in terms of model development and analysis in such fields as economics, operations research/management science, finance, as well as engineering (notably, transportation science), and environmental sciences, even with policy implications. The theoretical results that we obtained while at the Bellagio Center, the applications that can now be explored, include some that can be interpreted in a new way, as well as entirely new and very exciting ones (notably, to global supply chain networks and international financial networks) and will be written up in a series of papers.

When the intensity of our research and work necessitated a respite, we would take some time for a meal, a walk, or a song; laughter would soon follow. We got to share with artists, musicians, writers, human rights activists, public health experts, and historians what we

consider to be the beauty of mathematics, its relevance, and its special nature in terms of research, creativity, and scientific discovery. We found that many of the residents eagerly anticipated our seminar presentation, which was unique because it was being presented not only by three females, but also by three female mathematicians.

Our presentation took place on Friday night, March 19. We discussed the context of our work, with Anna providing the background and foundations, and focusing on a spectrum of network-based applications that had been studied as finite-dimensional variational inequality problems and as projected dynamical systems. Some applications that were described included supply chain networks and international financial networks with intermediation as well as recycling networks (for relevant papers, see <http://supernet.som.umass.edu>). Patrizia followed with an overview of her modeling work on time-dependent spatial price and financial network models using evolutionary variational inequalities, coupled with her contributions to the existence and uniqueness of the solutions. Monica provided not only a discussion of infinite-dimensional projected dynamical systems but even showed dynamic trajectories using Maple. She also discussed why math is important, what is special about math, and listed some of the unsolved problems dating to the 19th century. The three of us also summarized the work that we had accomplished during the residency and highlighted the impact that it might have.

The research team residency was an experience of a lifetime. It demonstrated the rewards of a sustained collaboration in an environment of great beauty and without

the obligations of daily life. It was a privilege to be able to partake in the activities of the Bellagio Center during our two-week tenure, and we hope to return to our disciplines what we learned and discovered. Finally, we hope that we helped to get across the idea that mathematicians can be very dynamic, social, and engaging individuals, with interests that transcend different areas.

For background on the Rockefeller Foundation's Bellagio Center Program, see <http://www.rockfound.org>.

Acknowledgments

We are deeply grateful to the Rockefeller Foundation's Bellagio Center program and to its staff for giving us this incredible opportunity.

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CALL FOR NOMINATIONS: LOUISE HAY AWARD

The Executive Committee of the Association for Women in Mathematics has established the Louise Hay Award for Contributions to Mathematics Education, to be awarded annually to a woman at the Joint Prize Session at the Joint Mathematics Meetings in January. The purpose of this award is to recognize outstanding achievements in any area of mathematics education, to be interpreted in the broadest possible sense. The annual presentation of this award is intended to highlight the importance of mathematics education and to evoke the memory of all that Hay exemplified as a teacher, scholar, administrator, and human being.

The nomination documents should include: a one to three page letter of nomination highlighting the exceptional contributions of the candidate to be recognized, a curriculum vitae of the candidate not to exceed three pages, and three letters supporting the nomination. It is strongly recommended that the letters represent a range of constituents affected by the nominee's work. Five complete copies of nomination materials for this award should be sent to: The Hay Award Selection Committee, Association for Women in Mathematics, 4114 Computer & Space Sciences Building, University of Maryland, College Park, MD 20742-2461. Nominations must be received by **October 1, 2004** and will be kept active for three years. For more information, phone (301) 405-7892, email awm@math.umd.edu or visit www.awm-math.org. Nominations via email or fax will not be accepted. (Please note that beginning next year the deadline for nominations for this award will be moved to April, so that nominations for the 2006 award will be due April 30, 2005.)

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EDUCATION COLUMN

WHO'S THE (MATH) FAIREST OF THEM ALL?

Column Editor: Ginger Warfield, Department of Mathematics, University of Washington, Seattle, WA 98195; warfield@math.washington.edu.

A year ago I read in the *PIMS Newsletter* about a project Ted Lewis was doing at the University of Alberta. Students in his course for future elementary school teachers ran math fairs at which families from whole elementary schools came to the university campus for an evening of non-competitive mathematical games and puzzles. Not only were the schools and families filled with enthusiasm, but also the university course shot up in popularity and effectiveness. The impact was so impressive that it won him an award. It sounded lovely and definitely relevant to my own courses for elementary school teachers.

As soon as I let myself start thinking about attempting a similar project, a whole collection of modifications and local adaptations and extensions began to suggest themselves to me. The version of the Math Fair I did was a slightly more localized one. I have the good fortune to be working with a GK–12 project that takes graduate

students into some local elementary schools to support teachers who are implementing a standards-based math curriculum. I work primarily with Leschi Elementary School in Seattle's Central Area, and the principal and a number of teachers there enthusiastically supported the project. Several GK–12 fellows agreed to participate as well, which made the group of participants large enough to make the fair possible.

Localizing to one school was in some sense a reduction of the suggested format. On another front I augmented it: instead of having the students in my course for future elementary teachers (Math 171) run the games and puzzles themselves, I added an intermediate phase of having them teach Leschi students how to do so. This turned out to be both logistically hair-raising and very rewarding. My Math 171 students were very excited about having a chance to work with the children in their classrooms. Many came back from their preparation sessions absolutely glowing, which is a good state for a future teacher.

The Math Fair itself was on a Tuesday evening from 6:30 to 8:00. We set up tables in the lunchroom and the gym. On each table was a puzzle ("Put these four pieces together to make a square, and then again to make a Greek cross"; "Put the colored dots into this triangle so that no dot touches another one of the same color"; ...) or a game ("Take turns removing one or two coins and try not to take the last one"; ...). In theory each table was presided over by Leschi students with background assistance from a Math 171 student or a GK–12 fellow and general supervision from their own classroom teacher. In practice a few of the tables ran that way, and more of them wound up directly in the hands of the Math 171 students. Our primary goal was to have many Leschi families come to the fair and have a lot of fun doing math together, and this goal we definitely met. We didn't do an attendance count, but both the lunchroom and the gym had enough of a population to keep the energy bouncing from the walls, and almost all of that population was families. You can get some impression of the event if you check out www.math.washington.edu/~warfield/Math_Fair/Math_Fair.html, where I have posted a bunch of pictures.

Two additional elements worked out nicely, one of them in an unexpected way. We promised "mathematical snacks," kindly supplied by the math department at the

University of Washington. I got to select them (Costco all the way!) and label them—great fun. There were parallel lines (sticks of cheese), mini-toruses (bagels), and circular disks, stacked (Oreos) and not (vanilla wafers), plus a few others. They may have been educational, and they certainly were entertaining. We also invited people to come and make a giant tetrahedron. (“What’s that? Come and find out!”) For that I brought in lots and lots of clear drinking straws and ribbon. My original idea was that each child could make a tetrahedron, and then we would tie them in fours to make a super-tetrahedron, then take sets of four of the larger ones and make a super-super-tetrahedron, and maybe even take it up from there. As it turned out, they loved making the tetrahedra and did it very well. What they didn’t want was to do was part with them, so instead of producing a giant one, we had lots of kids heading home with colorful tetrahedra trailing behind them.

As is presumably clear by now, I wound up highly

enthusiastic and with every intention of continuing to do this in my courses for future elementary school teachers. If you would like to try one (and I heartily encourage you to do so!), there is lots of help available. “The math fair booklet” by Ted Lewis is available through the Pacific Institute for the Mathematical Sciences (www.pims.math.ca), and there is even a web site about math fairs: www.mathfair.com. The basic benefits are manifold: a positive mathematical experience for a batch of kids, a chance to involve families in some lively mathematical experiences, and an opportunity for future elementary school teachers to have a little exposure to kids and their thinking. There’s one more benefit that is slightly less obvious, and that is the reason I hope to entice some of my colleagues into taking part in some of these: it is a straightforward way for those of us on university campuses to show our interest in and support for our often beleaguered elementary schools. Not to mention that it is a tremendous amount of fun!

COLLABORATIVE RESEARCH GRANTS FOR WOMEN

Dedicated to the memory of Ruth Michler

The objective of the Collaborative Research Grants, supported by the University of North Texas and the NSF through Ruth Michler’s POWRE grant, is to enable women who are already tenured to carry out collaborative research at other institutions. (Women who are not yet tenured are referred to the Mentoring Grants Program.) The length of stay may vary from one week to several months, although only partial support will be provided for the longer stays. Each grant will fund travel, accommodations, and other required expenses for a tenured woman mathematician to travel to an institute or a department to do research with a specified individual. Typical grants will be under \$4000, although higher amounts may be awarded in exceptional cases. All travel must be completed by August 31, 2004. For foreign travel, US air carriers must be used (exceptions only per federal grant regulations; prior AWM approval required).

Applicants must be women mathematicians with a work address in the US. Slight preference will be given to women who have been recently tenured or who have an equivalent level of experience in an industrial or governmental position. The applicant’s research must be in a field that is supported by the Division of Mathematical Sciences of the National Science Foundation. (See <http://www.nsf.gov/od/lpa/news/publicat/nsf03009/mps/dms.htm#1> for the list of supported areas.)

An application should consist of: 1) a cover letter; 2) a curriculum vita; 3) a research proposal (approximately five pages in length) which specifies why the proposed travel would be particularly beneficial; 4) a supporting letter from the proposed collaborator (who must indicate his/her availability at the proposed travel time), together with the curriculum vita of the proposed collaborator; 5) a proposed budget; and 6) information about other sources of funding available to the applicant. A final report will be required from each awardee. All awards will be determined on a competitive basis by a selection panel consisting of distinguished mathematicians appointed by the AWM. If you have questions, contact AWM by phone (301-405-7892) or email (awm@math.umd.edu).

Send *five* complete copies of the application materials (including the cover letter) to: Collaborative Research Grant Selection Committee, Association for Women in Mathematics, 4114 Computer & Space Sciences Building, University of Maryland, College Park, MD 20742-2461. Applications are invited and must be received by **May 1, 2004**. Applications via email or fax will not be accepted.

BOOK REVIEW

Book Review Editor: Margaret Bayer, University of Kansas, Lawrence, KS 66045-7523, bayer@math.ukans.edu

WOMEN IN MATHEMATICS AND SCIENCE: A REVIEW OF BIBLIOGRAPHIC RESOURCES

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"You have five minutes. Your challenge is to name twenty famous U.S. women from the past or present—no sports figures, no entertainers, and only presidents' wives who are famous in their own right." [10] This challenge was presented by Myra and David Sadker to hundreds of high school students around the country, and sadly they reported that on average students can list only four or five women. Imagine giving a narrower version of this challenge to the mathematics and science students in your calculus class, or even to a group of mathematics majors in an upper-level course. If asked to name even five famous women mathematicians or scientists, most students would be hard pressed to come up with a name other than Marie Curie. If we want to attract talented girls into science and mathematics, they need to see examples of successful women scientists and mathematicians. There are many ways that we can bring these role models into the curriculum, from developing whole courses on women in mathematics and science, to including more women in our math history courses, to including the contributions that women have made to the content in the mathematics or science courses that we teach on a regular basis.

Since the 1970s, there has been an explosion of books and articles that bring to light the contributions and lives of women scientists, critique science from a feminist point of view, or study workplace and educational issues for women in science. Nearly all books that refer to women in science include mathematics as one of the fields of science. Many of these books have been previously reviewed in this column. Reference materials such as review essays, catalogs, indexes, bibliographies, dictionaries, and encyclopedias can be invaluable in sorting through the voluminous amount of reading material that is now available. The purpose of this "book

review" column is to do a short survey of two types of these reference sources; namely bibliographies and biographical source books or dictionaries.

Some of the published bibliographies are useful for finding a selection of books and articles that address a particular theme. The most comprehensive bibliography that I have found is Marilyn Bailey Ogilvie's *Women and Science: An Annotated Bibliography*. [9] There are over 2700 citations, arranged alphabetically, with dates of publication through 1993. Each entry is annotated and indexed by field, nationality, time period, persons and institutions, reference type, and theme. The fields range from broad categories such as mathematics and medicine to specific categories such as ichthyology. Works covering all time periods, geographic areas, and languages are represented. Some of the more useful themes include "Education and employment of women," "Feminist critiques of science," "Gender and mathematics," "Gender and science," "Gender and technology," "Science education," and "Science in women's lives." The annotations vary in length from a short paragraph to one sentence, and in a few cases when the title is fairly self-explanatory there is no annotation. The annotations are an indispensable way of weeding through the many sources that are listed. Generally they give a short summary of what you will find in the work and indicate if the entry contains tables, photos, notes, indexes, etc.

In the theme index, I found 19 entries listed under "Gender and mathematics," which led me to works such as collective and individual biographies of women mathematicians, an article on the percentages of women in mathematics, and a collection of essays about mathematics learning and gender. However, while some of the collective biographies of women mathematicians were listed here, there were others that were not indexed in this way. It was not clear to me how the decision was made to include a title under this theme. While all of the included collective bibliographies of women mathematicians are listed in the "mathematics" field index (156 citations) or under "collective biography" in the reference index (223 citations), it is time-consuming to look up this many entries. However, the persons and institutions index quickly led me to 24 citations pertaining to Sonia Kovalevskaia including (among other things) her own autobiography, her picture, a list of her publications, and an analysis of her contributions to mathematics.

Four other bibliographies deserve mention here.

Ogilvie's bibliography is an expansion of the partially annotated bibliographic guide published by the University of Wisconsin System Women's Studies Librarian. [13] The advantage of this bibliography is that the citations are grouped by category. For example, there is a section listing only biographies for mathematics, statistics, and computer science. The same organization has published a bibliography by Linda Shult that concentrates on women and information technology. [11] This partially annotated bibliography contains over 750 works with dates of publication through 1996 grouped into categories such as computer science and education, technology and women's employment, and on-line usage and resources. *Women in Mathematics and Physics* is an annotated bibliography published by the University of Michigan's Center for the Education of Women. [2] It contains detailed annotations for 113 articles that represent research studies focusing on women in mathematics and science at the higher education level published between 1970 and 1991. Most of these citations will not be found in the previously mentioned bibliographies. Finally, Women and Mathematics Education (WME) publishes the most recent bibliography that I have found. Its latest bibliography covers the period 1996–2000 and is not annotated. [1; see also 6] While the focus is on resources for gender equity in mathematics, there are quite a few citations for women in science and technology, and the bibliography lists other types of media resources such as websites and videotapes.

While bibliographies can be used to find a list of references covering a broad theme, a better place to find information about individual women in science are the biobibliographic source books and dictionaries. The editors of these books generate a list of women using a set of criteria that usually include an assessment of their contribution to the field and date of birth. Each name is accompanied by a biographical entry and a bibliography. The most recent and comprehensive of these books is the dictionary of women in science edited by Marilyn Bailey Ogilvie and Joy Harvey. [8] This two-volume set contains biographical information for about 2500 women scientists of all nationalities and fields. The time period covered ranges from antiquity to the twentieth century, although living scientists were only included if born prior to 1910. As Margaret Rossiter states in the foreword, the large scope of the dictionary makes it possible to do cross-comparison studies of scientists within a field or within a designated time period. Another

advantage of the dictionary is in the sheer number of women represented, making it easy to find both Nobel Laureates and other lesser-known women who have made contributions to science. However, because of the large number of women in the book, by necessity the entries do not go in depth into each woman's life and work. The bibliography given for each woman is not comprehensive but is only a starting point for further research. For example, no primary sources are listed for mathematician Olga Taussky-Todd, although the essay does mention that she published extensively.

For more in-depth information about women scientists, I recommend the set of three source books edited by Louise Grinstein and others. While fewer women are listed in these books, both the biographical information and the bibliographies are more extensive and cover both the life and work of each woman. The three books focus on women in mathematics ($n = 43$) [5], women in chemistry and physics ($n = 75$) [4], and women in the biological sciences ($n = 65$) [3]. The books are primarily historical, in that the women included are either deceased or were born prior to 1933. Each individual essay has three parts: a short biography including family background, education and career; a description of the woman's work and its impact on the field; and an extensive bibliography including "works by" and "works about" the woman. The writing is accessible and engaging, yet technical information about the scientists' work is given, making the books useful for experts and non-experts in the field. In contrast to Ogilvie and Harvey's dictionary, in this source book you will find a reference for a bibliography of the first 165 of Taussky-Todd's works, followed by a list of her remaining works, a list of titles about her work, and other references. In addition, one of the appendices contains a list of references for each woman in other collections.

Many other good dictionaries exist, but only two more will be mentioned here because of their slightly different focus from the ones previously discussed. If women have been neglected in writing the history of science, certainly minority women have been ignored almost completely. While there are some African-American women listed in both sets of work discussed previously, Wini Warren's book focuses on them exclusively, listing over 100 African-American women scientists that lived during the period 1900–1960. [12] Notes that contain some references follow each biographical essay, and there is an extensive bibliography at the end

of the book. For biographies of contemporary mathematicians, the dictionary edited by Charlene Morrow and Teri Perl contains biobibliographic entries for 59 women, many of whom are still living. [7]

The large amount of published material about gender issues and the contributions of women in science is wonderful, but it can make finding the right resources for educating ourselves and our students seem like a daunting task. Using the available reference material can help simplify this process. And when we present women scientists as role models to our students, we will attract more talented girls into mathematics and science.

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NON-STANDARD CAREERS

We continue our series of articles about women in mathematics whose careers have taken some unexpected twists and turns but have wound up satisfying. And we repeat our invitation: if you or someone you know has had such a career and would like to write about it, or to talk on the phone and have somebody else write about it, please get in touch with Ginger Warfield (warfield@math.washington.edu).

MY BRILLIANT CAREER¹

Cathy Kessel

G. H. Hardy left secondary school "with the inevitability of one who had got on to the right tramlines, with an open scholarship to Trinity.... He did not have to think about his career. From the time he was twenty-three he had all the leisure that a man could want, and as much money as he needed." Unlike Hardy, I did not get on the right tramlines, didn't always have quite as much

¹ The title of a satirical novel written by Stella Miles Franklin and of a 1979 movie directed by Gillian Armstrong.

money as I needed, and often had to think about my course through life.

I could write a book about early influences on me. A major influence was the University of Chicago, where my parents met, where my father taught, where I went to school (at the University of Chicago Laboratory School) and to college. I learned about what might be called intellectual collegiality. My parents and their faculty friends (including Stephen Stigler's father George) talked about their interests all the time—during commutes to the university, Thanksgiving and Christmas dinners, and visits to summer homes.

Because my father had academic jobs in several places, I attended different schools for grades 1, 2, and 3 (punctuated by summers in Chile). I was unhappy with the third school (a suburban public school where my teacher tried to make me write with my right hand although I am left-handed), so my parents decided to have me try the Lab School. The Lab School was started by John Dewey, and it has retained some progressive ideas. I don't remember receiving grades for courses until high school and wasn't aware of class rankings or other comparisons often explained by differences in ability, perhaps one reason why findings about U.S. and Japanese attitudes toward effort and ability were later of such interest to me.

Gradually I became aware of gender differences in my classes. (Why they occurred is a question that has interested me for much of my life.) In sixth grade I discovered that I was the only girl to sign up for shop class. My high school was small and had one accelerated mathematics class and one French class in each grade. Over the years, I noticed that girls dropped out of the mathematics class, although many stayed in the French class. In my last year of high school, I took calculus (and the AP test) and was one of two girls in my computer science class. In college there was one female mathematics professor (possibly the referent of the infamous Saunders MacLane comment about hiring a woman once). She didn't appear entirely confident in teaching. In hindsight it is not surprising, she was a beginning faculty member at a math department not particularly friendly to faculty women and was teaching point-set topology—not an easy course to teach (and a good topic for mathematics education research).

Like so many math majors, I read *A Mathematician's Apology* and *Men of Mathematics*. If I hadn't already decided to be a research mathematician, I probably

decided then, untroubled by worries about managing a husband and children because I wasn't interested in acquiring either. I was fascinated by algebra (taught from Herstein's book) and the idea of a mathematical structure. Model theory was a natural extension of this interest, and I took a graduate course in model theory in my third year of college. (Somehow it did not seem necessary to take an undergraduate course in logic, and I never did.) I became interested in logic and found out that Berkeley was the place to go. So in my last year of college, I applied to the graduate program in mathematics at Berkeley, was accepted, and went.

I had heard at Chicago that graduate school at Berkeley was "sink or swim"—which didn't bother me. What I didn't know was that the atmosphere for women was, as one graduate put it, "incredibly horrible." After three years at Berkeley, I went to the University of Colorado at Boulder. Eventually (including two years as a lecturer at Ohio State), I wrote a thesis in model theory, and graduated.

When I was looking for a job, I tried to find a place where I could do research. Because my experiences suggested that teaching was not taken seriously at large public universities (and in fact, that the structure of these universities militated against it), I accepted a job at a smaller place. Research was my primary interest, but I didn't want to be in a situation in which I was unable to perform my job well, and I considered teaching to be part of a professor's job.

My concern for teaching probably had several sources. I'd grown up with the idea that teaching was an occupation not to be undertaken lightly, both from my parents' attitudes and from my own good and bad experiences as a student. When I first began teaching as a teaching assistant at Berkeley I was shocked at the poor preparation of the students in my calculus sections. I noticed that their knowledge of what had supposedly been taught in lectures might be quite fragile. And, unfortunately, students seem more ready to criticize female professors, which also pushed me to think carefully about my teaching.

I had tried to choose my job carefully, but soon found myself dissatisfied. I wished for the intellectual collegiality that I had seen as a faculty child, as well as the intellectual intensity that I had experienced at Chicago and at Berkeley. I began to realize that what I'd experienced at Chicago is rare. Teaching, as well as research, was taken seriously, and there was also what might be

called “thoroughness” in the sense in which Liping Ma uses the word, “the capability to ‘pass through’ all parts of the field . . . to glue them into a coherent whole.” This coherence may be fostered by the emphasis on Plato and Aristotle. Aristotle often begins a discussion by inquiring about the “end of an activity,” and Plato’s dialogues often concern the warrants for an assertion. (Unfortunately, this thoroughness appears not to include analysis of the hiring procedures that result in few women on the math department faculty.) It often seems in academe that institutional and research activities take on lives of their own, losing sight of their original goals.

My students were dissatisfied with me—hindsight gained from mathematics education research suggests how what I asked of them differed from what they’d been asked to do in high school. A geometry course for preservice elementary teachers was particularly troubling. Many of the prospective teachers had attitudes toward mathematics that shocked me, and I had no sense of what they needed to know about geometry or how I could teach them to think mathematically. There was no reason that I should have, nothing in my graduate work or in my department had addressed this issue. I began to seek out research on mathematics education, making use of Interlibrary Loan.

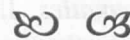
After three years, I took a leave of absence to attend the logic year at MSRI. I began my stay in Berkeley by attending a Mathematicians and Education Reform conference where I heard talks about innovations such as Uri Treisman’s calculus workshops. I wanted to understand more, and said, in essence, “This stuff is interesting, but does anyone do research about it?” The reply was, “You should talk to Alan Schoenfeld.”

Alan Schoenfeld, as many know, is a mathematician turned mathematics education researcher at the School of Education at Berkeley. I think he’s unusual, perhaps unique, in his grounding in educational research, courtesy of a post-doc with a cognitive scientist, and his continuing interactions with a variety of education researchers, anthropologists to psychometricians. I was fortunate enough to be able to audit courses and participate in the research projects of Schoenfeld’s group, including an analysis of Schoenfeld’s problem-solving course (published in *Research in Collegiate Mathematics Education*) and a laboratory study on students’ understanding of linear functions (fodder for several book chapters and journal articles, I am a co-author of one in *Cognition and Instruction*). I quit my job (my

1990 *UME Trends* article gives my rationale) and for a while supported myself with part-time teaching jobs at a community college, a workplace literacy program, Berkeley, and Mills College—allowing me to reflect on the ideas I was encountering at the School of Education, but without the opportunity to teach a course, think about how I might do it differently, and teach it again. At Mills I taught calculus, used what I had learned at the School of Education, and, for the first time, was able to enjoy teaching.

Through my connections at Berkeley, I began to get jobs that concerned mathematics education research. For example, I worked as a scorer on the Video Portfolio Project for the Educational Testing Service, a study of the feasibility of certifying teachers as highly accomplished using “video portfolios” of their teaching. I went to Australia three times to collect data for a project on student learning in classrooms. This involved videotaping the students and teachers (one camera on a small group of students, one camera on the teacher), listening to the students during class (through a microphone attached to headphones), taking notes that were time-tagged to the videotape (which I mixed), and interviewing the students immediately after class, playing clips from the video and asking about selected incidents. (Analysis of the interviews and videotapes is the subject of *Perspectives on Practice and Meaning in Mathematics and Science Classrooms*.) A job listed on my c.v. under Curriculum and Exam Development was developing tasks for the New Standards High School Reference Exam (described in Ann Shannon’s *Keeping Score*) and rubrics for grading them.

Studies of women in academe suggest that I never could have gotten on the right tramlines as Hardy did. But those tramlines were not the only route to my desires. Intellectual collegiality has gradually come my way, although it does not occur (as for Hardy or my father) in the context of a university job. Because I have no opportunities for promotion, I have no financial need to publish any articles, which allows me time to think about and to work on those articles that I do publish. And my later progress through life has illuminated my earlier wanderings, one reason to call it a brilliant career.



AWM WORKSHOP FOR WOMEN GRADUATE STUDENTS AND RECENT PH.D.'S

supported by the Office of Naval Research, the National Security Agency, and the Association for Women in Mathematics

Over the past sixteen years, the Association for Women in Mathematics has held a series of workshops for women graduate students and recent Ph.D.'s in conjunction with major mathematics meetings.

WHEN: The next AWM Workshop to be held in conjunction with the Joint Mathematics Meetings will take place in Atlanta, GA, January 5-8, 2005. The workshop is scheduled to be held on Saturday, January 8, 2005 with an introductory dinner/discussion group on Friday evening, January 7.

FORMAT: Twenty women will be selected in advance of the workshop to present their work; the graduate students will present posters and the recent Ph.D.'s will give 20-minute talks. AWM will offer funding for travel and two days subsistence for the selected participants. The workshop will also include a panel discussion on areas of career development, a luncheon and a dinner with a discussion period. Participants will have the opportunity to meet with other women mathematicians at all stages of their careers. All mathematicians (female and male) are invited to attend the program. Departments are urged to help graduate students and recent Ph.D.'s who do not receive funding to obtain some institutional support to attend the workshop presentations and the associated meetings.

MENTORS: We also seek volunteers to lead discussion groups and to act as mentors for workshop participants. If you are interested in volunteering, please contact the AWM office.

ELIGIBILITY: Applications are welcome from graduate students who have made substantial progress towards their theses and from women who have received their Ph.D.'s within approximately the last five years, whether or not they currently hold a postdoctoral or other academic position. Women with grants or other sources of support are still welcome to apply. All non-US citizens must have a current US address. All applications should include a cover letter, a concise description of research (two or three pages), a title of the proposed poster or talk, a curriculum vitae, and at least one letter of recommendation from a faculty member or research mathematician who knows the applicant's work. In particular, a graduate student should include a letter of recommendation from her thesis advisor. Nominations by other mathematicians (along with the information listed above) are also welcome. For some advice on the application process from some of the conference organizers see the AWM website.

Send five complete copies of the application materials (including the cover letter) to:

Workshop Selection Committee
 Association for Women in Mathematics
 4114 Computer & Space Sciences Building
 University of Maryland
 College Park, Maryland 20742-2461

Phone: 301-405-7892

Email: awm@math.umd.edu URL: www.awm-math.org

APPLICATION DEADLINE: Applications must be received by September 1, 2004. Applications via email or fax will not be accepted.

HOW DO WE GET MORE WOMEN INTO MATHEMATICS?

IDEAS AND EXPERIENCES COLLECTED BY EUROPEAN WOMEN IN MATHEMATICS

Marjatta Näätänen, Department of Mathematics, University of Helsinki, marjatta.naatanen@helsinki.fi

Abstract. European Women in Mathematics (EWM) was registered as a legal association in 1993 in Helsinki, Finland. This report concentrates on ideas and experiences from the EWM meetings on how to get more women into mathematics. Also data on the situation of women mathematicians in various countries are presented. The data have been collected by women mathematicians themselves from statistics and from their personal experiences. The recommendations have been discussed and collected at the general meetings of EWM.

1. Introduction

The shortage of people with good mathematical education is a general problem nowadays in developed countries. Especially the number of women in the field is low in many countries. The problem is actually two-fold, on one hand a complex problem of the condition of women and on the other hand a problem of the attractiveness of mathematics as a field of study. This paper contains various ideas tried or planned in European countries in order to attract more girls and women into mathematical studies.

2. General situation of women in the academic environment

The underrepresentation of women is a global problem addressed in reports by international organizations like OECD, UNESCO, and the EU. A careful case study from Sweden, dealing with the effect of gender on individual academic competence evaluation, was published by Wennerås and Wold (1997).

The underrepresentation of women has many problematic aspects: individuals may not choose careers best suited to their capabilities and interests; science loses human resources and women's potentially different points of view; the education women have obtained may be lost; and equal treatment and opportunities is not realized, a question of discrimination.

Actions taken in various countries consist of: legal

actions; the use of quotas; money or positions such as professorships earmarked for the underrepresented sex; administrative actions, strategies, and plans; time limits to reach the goals; special awards; mentoring programs; guidelines to eliminate harassment; and forming support networks. It is instrumental to follow up on these actions by collecting statistics and making follow-up studies. Countries in the EU especially active in trying to improve the situation include Germany, Holland, Norway, and Sweden.

General situation in Finland

The trend in Finland is that women under 55 years of age are on the average better educated than men; in 1998 females were 55% of new university students and 58% of graduate students. At the Ph.D. level there are 40% women.

On the other hand, it is more difficult for women to get permanent jobs, women are 18% of professors and 51% of university lecturers (which is a tenured position, traditionally teaching-oriented, in Finland). It is interesting that when electing professors in 1997 through the normal procedure, 27% of the elected were women, but through the so-called invitation process only 17%.

Jarkko Voutilainen, University of Turku, made a discrimination experience study in 1996 at the licentiate or doctoral level. Some results were that 16–29% of women and 80% of men had no experience of discrimination; 25–33% of women and 90% of men thought that gender had not hindered their careers, while 20–25% of women claimed that gender had hindered their careers considerably or a lot.

3. The problem with the attractiveness of mathematics

Even though mathematics is a key for development, it is paradoxically losing its attractiveness in industrialized countries as its importance grows. The relationship nowadays between economic and scientific development is a highly complex and subtle subject. An increase in economic development could bring additional funds and facilities for education and research. Scientific research needs at least minimal infrastructure as well as

well-trained personnel. An increase in industrial activity creates a need for more sophisticated technology, which requires better scientific education. This is a challenge for small countries. If liberal economic policies are followed, the results are: less influence for the state, private investors get opportunities, and the country opens to transnational commerce and economic activity. This gives rise to a huge import of sophisticated technology. Small countries begin to be invaded by imported science and technology without the real possibility of fully understanding the essential theory underlying each device.

World Mathematics Year 2000 campaign was launched to improve the position of mathematics and to promote worldwide understanding that mathematics is a strategic keystone for the economic and cultural development of a nation. The vital role of mathematics has for too long been hidden from the public. Mathematics is the unseen engine that powers much of our modern world; it needs to be brought to the forefront and celebrated as a key creative industry.

Nonmathematicians generally think there is nothing new to discover in mathematics and accept that perhaps some technological advances are based on its applications. They should be made to understand that mathematicians make new discoveries every day, that mathematics is a part of any new technological invention and has applications to computer science, communications theory, physics, finance, biology....

In our society nowadays the general trend is to maximize stimuli for the senses and minimize the efforts of body and mind, the so-called entertainment society. Mathematics requires patience, concentration, work, mental energy, and the capacity to undertake long-term tasks. Its rewards are overcoming intellectual challenges and the satisfaction of fulfilled tasks—all opposite to the easy entertainment that gives impulses to the senses. Mathematics is considered too difficult and boring for great audience. Is this an unnecessary dumbing down?

Mathematics and development of the human mind

Mathematics provides the first contact with rationality and criticism at the childhood level. When mathematics is well taught, it gives the child the opportunity to learn about the scientific method in practice and have fun with their own scientific discoveries. Mathematics is deeply connected with logical thinking. No scientific development can start without first improving

mathematics skills. Mathematics is deeply involved with the development of all of humankind; in particular it is a strategic keystone for the economic development of any nation.

4. How to get more women into mathematics? Ideas and experiences from EWM meetings

European Women in Mathematics - EWM

EWM consists of a network of women mathematicians across Europe and beyond. EWM was registered as a legal association in 1993 in Helsinki, Finland. Now it has about 250 members from 22 countries. Before 1993, EWM acted for several years as an informal network and arranged meetings.

The aims of the association are: to encourage women to take up and continue studies in mathematics; to support women with or desiring careers in research in mathematics or related fields; to provide a meeting place; to foster international scientific communications; to promote equal opportunity and equal treatment of women and men in the mathematical community; and to cooperate with groups and organizations with similar goals. EWM organizes meetings, sets up committees, and collects statistics. New methods for teaching and running seminars are experimented with during the meetings of EWM. Mentoring activity has recently begun.

Bringing together ideas and trying to find solutions for problems shared in various countries is one of the aims of EWM. The few women mathematicians are scattered across all countries, hence modern technology is used to run the society. For further information see <http://www.math.helsinki.fi/EWM>.

General situation of women in different cultures

In discussions organized by EWM it was agreed that the problems seem very similar regardless of culture: there is no equality between women and men. Women are struggling to meet several full-time commitments and a lot of expectations of society. Since women are so few, they often feel isolated, and a supportive network of women is of great importance.

In general women having children should be given all the legal support to obtain optimum conditions; care should be taken to prevent a social problem, that of parents working long hours and neglecting their children.

We should expect as a fundamental right legislation enabling the time available to work to be coordinated with the time that parents need to be at home with their children. It is important that females not be penalized because of unfair expectations by society.

Positive discrimination in favor of women is not very flattering, and the ones who benefit from it may tend to lose with respect to the prestige they enjoy. The best person for a particular job should be chosen.

A matter of great common concern is the diminishing number of mathematics students: mathematics is losing its attraction even as its importance in most fields is growing.

The situation in some European countries

Greece: Why is mathematics so popular in Greece? Is one reason the importance given to the subject at the secondary level in Greece? This could be connected to the important role of Greece in mathematics history. However, the number of women qualified in mathematics who make it to the higher grades is low. And men seem to find financial aid more easily than women do.

Malta: New degree courses in related subjects like computer science, information technology, business studies and accountancy may have contributed to the reduction of mathematics undergraduates. The occupation offered to them is mainly teaching.

UK: Many mathematics graduates work as statisticians in the accountancy, financial, insurance and nuclear fuel fields. In the UK there is no discrimination against female math undergraduates. The negative bias starts when looking for an occupation or for a postdoc; men seem to be favored. Experience in the UK hints that single-sex schools may encourage girls to achieve better in mathematics.

Sweden has been aiming to appoint a female professor in every department to provide role models.

Switzerland and Germany have occupied the last places in EWM statistics on women engaged in mathematics. The German Mathematical Society has made surveys yielding the numbers of women involved in mathematics at German universities. Some initiatives taken in Germany to increase the percentage of female professors are special funding, women's counselors and quotas.

NSF-AWM TRAVEL GRANTS FOR WOMEN

The objective of the NSF-AWM Travel Grants program is to enable women to attend research conferences in their fields, thereby providing a valuable opportunity to advance their research activities and their visibility in the research community. By having more women attend such meetings, we also increase the size of the pool from which speakers at subsequent meetings may be drawn and thus address the persistent problem of the absence of women speakers at some research conferences.

Travel Grants. These grants provide full or partial support for travel and subsistence for a meeting or conference in the applicant's field of specialization. A maximum of \$1000 for domestic travel and of \$2000 for foreign travel will be applied. For foreign travel, US air carriers must be used (exceptions only per federal grants regulations; prior AWM approval required).

Eligibility. These travel funds are provided by the Division of Mathematical Sciences of NSF, and the research conference must be in an area supported by DMS. (See <http://www.nsf.gov/od/lpa/news/publicat/nsf03009/mps/dms.htm#1> for the list of supported areas.) Applicants must be women holding a doctorate (or equivalent experience) and having a work address in the US (or home address, in the case of unemployed mathematicians). Anyone who has been awarded an AWM-NSF travel grant in the past two years is ineligible. Anyone receiving significant external governmental funding (more than \$1000 yearly) for travel is ineligible. Partial travel support from the applicant's institution or from a non-governmental agency does not, however, make the applicant ineligible.

Target dates. There are three award periods per year. An applicant should send *five* copies of 1) a cover letter, including the conference name, conference dates and location (city/state/country), and amount of support requested, 2) a description of her current research and of how the proposed travel would benefit her research program, 3) her curriculum vitae, 4) a budget for the proposed travel, and 5) a list of all current and pending travel funding (governmental and non-governmental) and the amounts available for your proposed trip to: Travel Grant Selection Committee, Association for Women in Mathematics, 4114 Computer & Space Sciences Building, University of Maryland, College Park, MD 20742-2461. If you have questions, contact AWM by phone (301-405-7892) or email (awm@math.umd.edu). Applications via email or fax will not be accepted. The next two deadlines for receipt of applications are **May 1** and **October 1, 2004**.

Grant for a *Habilitation* is given to applicants of both sexes for a period of three years. In some counties the aim is to prevent the decline of the percentage of women on higher rungs of the academic ladder. If the committee giving the grants consists of equally many women and men, they manage to realize that aim. *Wiedereinstiegsförderung* is meant for women who for family reasons had to interrupt their careers and now wish to (re-)start their *Habilitation*. [Note: In Germany there are two types of thesis: the first corresponds to our Ph.D, perhaps a bit less, and the second, *Habilitation*, is a qualification for a professorship.]

It is paid for a period of two years. Yet women hesitate to apply for these grants, in particular the *Wiedereinstiegsförderung*, as they are problematic from various angles: they are not generally respected, and there is a general fear that having them in your CV creates a bad impression. Also, they are just temporary funding; once terminated they leave you to a still uncertain future. Thus all in all a permanent solution would be highly preferable.

Most German and Swiss universities have at least one women's counselor, *Frauenbeauftragte*, in most cases one per faculty and an overall one for the whole university. They act as counselors and give active support to women who come up with particular problems; they generally act to prevent discrimination against women. Results seem to vary widely. For women it may be a great relief just to know there is someone whom they can

contact in cases of emergency (e.g., discrimination against female students during oral examinations). For the *Frauenbeauftragte* him/herself life sometimes is not so pleasant since (male) reactions to their existence are still ambiguous, yet acceptance seems to be improving.

In the county of Hessen there is a quota on the employment of women in public institutions. At universities the aim is to have the same percentage of female assistants on a faculty as of women receiving their diplomas from that faculty. The percentage of female professors on a faculty should equal the percentage of women holding a *Habilitation* all over Germany. Up to now it works out very well for the assistant level, but not at all for the professorial level. Rumors claim that the committees who work out the ranking of applicants for a professorship never place a woman among the top three unless they want to have her in the first place, for fear she might be appointed by the ministry for political reasons—being pro-woman is politically correct.

Former East Germany: Women were encouraged to pursue both family life and their careers. It was considered normal that a woman had a full time job; day nurseries and schools were provided, offering three meals, educational and entertainment programs in extremely small groups, sometimes five children per tutor. Permanent postdoc jobs required less mobility. Nowadays Germans have to find a private nurse and pay a lot of money if they want good day care.

More information about the situation of women in

CALL FOR NOMINATIONS: ALICE T. SCHAFER MATHEMATICS PRIZE

The Executive Committee of the Association for Women in Mathematics calls for nominations for the Alice T. Schafer Mathematics Prize to be awarded to an undergraduate woman for excellence in mathematics. All members of the mathematical community are invited to submit nominations for the Prize. The nominee may be at any level in her undergraduate career, but must be an undergraduate as of October 1, 2004. She must either be a US citizen or have a school address in the US. The fifteenth annual Schafer Prize will be awarded at the Joint Prize Session at the Joint Mathematics Meetings in Atlanta, Georgia, January 2005.

The letter of nomination should include, but is not limited to, an evaluation of the nominee on the following criteria: quality of performance in advanced mathematics courses and special programs, demonstration of real interest in mathematics, ability for independent work in mathematics, and performance in mathematical competitions at the local or national level, if any.

With letter of nomination, please include a copy of transcripts and indicate undergraduate level. Any additional supporting materials (e.g., reports from summer work using math, copies of talks given by members of student chapters, recommendation letters from professors, colleagues, etc.) should be enclosed with the nomination. Send *five* complete copies of nominations for this award to: The Alice T. Schafer Award Selection Committee, Association for Women in Mathematics, 4114 Computer & Space Sciences Building, University of Maryland, College Park, MD 20742-2461. Nominations must be received by **October 1, 2004**. If you have questions, phone 301-405-7892, email awm@math.umd.edu, or visit www.awm-math.org. Nominations via email or fax will not be accepted.

mathematics in different countries together with statistical data may be found in "Round Table D: Women and Mathematics," Kari Hag (ed.), *Proceedings of the European Mathematical Congress, Budapest 1996*.

Some recent studies in Finland

The attitudes towards mathematics were studied in TIMSS 1999. The average (over all participating countries) belonging to the highest group in positive attitudes was 37%, in Finland 21%, with a statistically significant difference between boys and girls, the strongest after Japan.

Atte Oksanen, University of Tampere, made a study in 2003: 75% of 10–11 year old Finnish girls, 50% of boys, are dissatisfied with their looks. Sari Näre got similar results 15 years ago, but then with children a couple of years older. The result indicates that restrictive role models are getting a strong hold on girls at earlier ages than before and that making choices earlier at school would be supportive to girls for choosing more mathematics studies.

Why are role models taking hold of children younger than before? According to a study by Intermedia, Finns spend about 7.5 hours per day with media (TV 2.5 hours, radio, books, magazines, advertisement, recordings, the Internet, videos—some of these overlap). The importance of media comes from its power to both reflect and modify our reality. It offers models and can manipulate people.

5. Recommendations

How can we increase the number of women mathematicians in higher positions and the interest of girls towards mathematics studies?

The visibility of women scientists was considered very important, hence talks, special lecture series and awards for women should be arranged and women scientists should also be visible in the media.

For women, flexible paths for career development and early permanent jobs could be helpful. A quota can be used to ensure that a fair percentage of qualified women rise at each stage to the next. It should be easier to obtain part-time employment, even as scientists on jobs with large responsibilities.

It is instrumental to increase the number of female students of mathematics. In order to achieve this goal,

attitudes of teachers at primary and secondary schools should be changed into encouraging girls to study mathematics and not discouraging them. In Finland if girls are weak in languages, they are told to study them anyway because they are needed, but if they are weak in mathematics, they are told it is best to give it up. Study advisers say even nowadays—especially to girls—that the long course of math is too tedious, it is easier to get points from languages or a short course of mathematics.

Mathematics should be made more attractive to students; hence the mathematical level of primary school teachers is very important. Attitudes and the basis of future studies come from the primary level. Equally important would be to convince employees to choose math graduates.

In several countries, curricular change at all levels has been experimented with. At the university level in Poland, mathematics has been combined successfully with fields like computer science, management, information technology, economics, natural sciences, biology and languages. At the high school level different streams can be tested.

In several countries, campaigns for girls to choose mathematics and exact sciences and open hours for girls to visit technical universities are arranged. Special meetings, programs, summer schools for girls, and meetings with women scientists could encourage and inspire female students.

Attitudes of society and of the media and upbringing at home are the basis. Making choices about mathematics studies earlier, before adolescence, would support girls, because parents treat their children more equally and girls have not adopted restrictive role models so strictly.

The message that mathematics is not for girls is given to girls by homes, schools, attitudes of society, strengthened and actively modified by the media. Collaboration with media should be tried in order to change the message to convey that mathematics is interesting and important, that women are needed to enrich and develop the new societies according to their ideas and values—deciding in which direction to develop, for example, the use of computers and technology.

This article is based on EWM's Trieste Proceedings. The main collaborators have been: MARIE DEMLOVÁ, Czech Technical University, Czech Republic; IRENE SCIRIHA, Malta; and ANKE WICH, Germany

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SCIENCE FUNDING

The Executive Committee of AWM joined other signatories on the two letters reprinted below.

Coalition for National Science Funding Recommendations on FY 2005 Funding for the National Science Foundation

The Coalition for National Science Funding (CNSF) appreciates the support that both the Congress and the Administration have demonstrated for the National Science Foundation through the enactment of the National Science Foundation (NSF) Authorization Act of 2002 (Public Law 107-368). P.L. 107-368 authorizes a five-year period of 15% annual budget increases for the NSF in order to sufficiently fund advancement in science, mathematics, and engineering. Even in tough budget times this kind of investment is critical. Investment in the NSF today will lead to new knowledge, technologies, and industries in the future just as investments in the past have done.

The CNSF urges Congress and the Administration to act upon their commitment to the NSF by increasing the FY 2005 funding level for this agency by 15% over the FY 2004 enacted budget.

The NSF is one of our nation's greatest tools for the promotion and advancement of scientific, mathematical, and engineering research and education. Although NSF accounts for only 4% of federal R&D spending, it supports nearly 50% of the non-medical basic research at our colleges and universities. It funds research in new frontiers of scientific inquiry and contributes to creating a highly skilled, competitive workforce in science and engineering.

NSF recognizes that scientific advancement often requires knowledge and discoveries across many disciplines, and partnerships across academia, industry, and government are an integral part of NSF's strategy to aid scientific development. Its research portfolio includes the biological sciences, the mathematical and physical sciences, the geosciences, computer and information science, the social, behavioral, and economic sciences, and engineering. All these areas of inquiry are essential for understanding our universe and the continued development of cutting-edge technology necessary for sustaining U.S. international competitiveness.

As Congress and the Administration stated in P.L.

107-368, "The National Science Foundation must be provided with sufficient resources to enable it to carry out its responsibilities to develop intellectual capital, strengthen the scientific infrastructure, integrate research and education, enhance the delivery of mathematics and science education in the United States, and improve the technological literacy of all people in the United States."

Without a sustained, significant investment in the NSF now, the future of the nation's international competitiveness is at risk. *CNSF urges Congress and the Administration to protect ongoing and future U.S. scientific and technological advancements by supporting a 15% budget increase in FY 2005 for the NSF.*

Note: A recent Microsoft Corporation full-page newspaper ad said: "Especially vital is the National Science Foundation, which sponsors discoveries across the frontiers of science, nurtures a technologically savvy workforce and helps build state-of-the-art facilities for pioneering science and engineering."

Math and Science Partnerships

March 25, 2004

The Honorable Arlen Specter
Chairman, Labor, Health & Human Services,
and Education

Dear Mr. Chairman:

We encourage you to continue the federal commitment to math and science education by maintaining the peer-reviewed Math and Science Partnerships (MSPs) at the National Science Foundation (NSF) and supporting robust funding for both the U.S. Department of Education (ED) and the NSF Math and Science Partnership programs.

We urge you to oppose the Administration's budget proposal that would phase-out the NSF MSP program and establish a new federal grant administered by the Secretary of Education that would, in effect, limit individual states' discretion to target much-needed funds for local science and mathematics education reforms.

We believe that the MSPs at both the Department of Education and at NSF are necessary and complementary. Without one, the other is significantly weakened.

The competitive, peer-reviewed, NSF MSPs seek to

develop scientifically sound, model, reform initiatives that will improve teacher quality, develop challenging curricula, and increase student achievement in mathematics and science. The funds appropriated under NCLB for the ED MSPs go directly to the states as formula grants, providing funds to *all* states to replicate and implement these initiatives throughout the country.

While we support the Administration's proposal to increase funding for the ED MSPs, we oppose the creation of a new \$120 million ED grant program that runs counter to congressional intent by focusing only on math and reducing state flexibility to target funds to areas of greatest need. We encourage you to oppose new restrictions on the additional funding slotted for the state-based ED MSPs.

In summary, we strongly urge Congress to: 1) reject the Administration's proposed phase-out of the NSF MSP program; 2) oppose additional restrictions to the ED MSP program; and, 3) provide robust funding for both MSP programs.

MAA PREP WORKSHOPS

Workshops are being offered this summer in the MAA's Professional Enhancement Program (PREP). Register online for these interesting opportunities. Application deadlines vary. Descriptions of two of the workshops follow; see www.maa.org/prep for more.

"Leading the Academic Department: A Workshop for Chairs of Mathematical Sciences Departments" will be held June 24-7, 2004, in Washington, DC. It is intended for department chairs who are new to the position as well as for those who have years of experience. The emphasis is on leadership, that elusive quality chairs are expected to possess but have little opportunity to develop and refine while dealing with the day-to-day demands of academic administration. This program is unique in that mathematics department chairs will have time to discuss issues and gain insights from colleagues in the same position at other institutions.

"Computational and Mathematical Biology" for mathematics faculty will be run in collaboration with a National Computational Science Institute (NCSI) workshop for biology faculty; there will be a number of crossover activities.

AWM PANELS IN PHOENIX

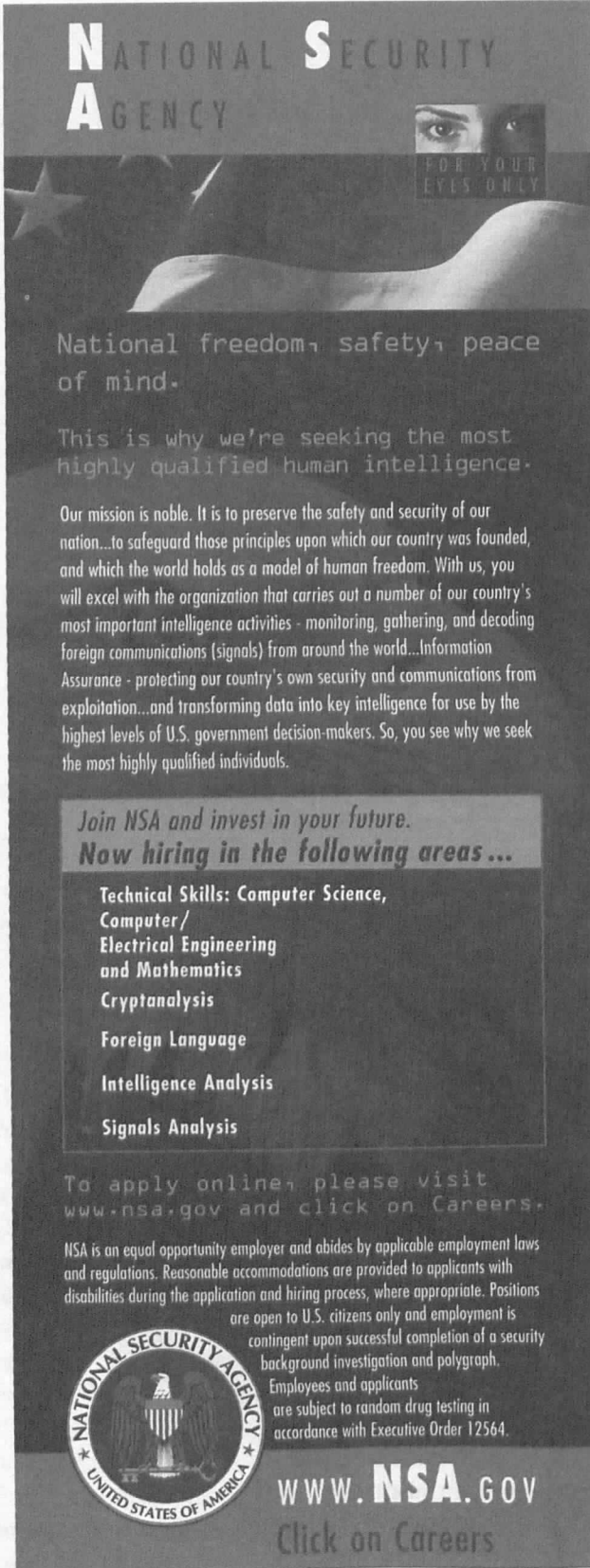


“Supporting the Diverse Personal Lives of Mathematicians”: Beth Bradley (University of Louisville), Elizabeth Stanhope (Willamette University), Cleopatria Martinez (Phoenix College), Helen Moore (American Institute of Mathematics, moderator) [not pictured: Jerome Dancis (Duke University)]



“Shaping a Career in Mathematics”: Jodie Novak (University of Northern Colorado, moderator), Anne Shepler (University of North Texas), Rachel Kuske (University of British Columbia), Janet McShane (Northern Arizona University), Tracy Fischer (Motorola), Joan Hutchinson (Macalester College), Barbara Keyfitz (University of Houston)

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BOWDOIN COLLEGE

Department of Mathematics

A two-year leave replacement position starting **Fall 2004**, at the Instructor or Assistant Professor level. Open to all applicants. Ph.D. preferred, ABD considered. Evidence of excellent undergraduate teaching is desirable. Normal teaching load is two courses per semester. Review of applications begins April 19 but applications will be accepted until the position is filled. Send completed AMS application cover sheet (www.ams.org), resume, 3 letters of recommendation, and ny available evidence of teaching excellence to **William Barker, Chair, Department of Mathematics, Bowdoin College, 8600 College Station, Brunswick, ME 04011-8486**. Include e-mail address. Bowdoin College is committed to equal opportunity through affirmative action. Women and minorities are encouraged to apply. Bowdoin College is a private, highly selective, undergraduate institution located half an hour from Portland and two hours from Boston.

More information about the Department and College can be found at www.bowdoin.edu

University of California, Riverside

Department of Mathematics

Temporary Faculty Positions

Applications are invited for two or more **Visiting Assistant Professor** positions beginning September 2004 contingent upon available funding. Applicants must have demonstrated experience or show strong promise in research and teaching. The positions are open to applicants from all research areas in mathematics. The teaching load is six quarter courses per year. Candidates must have received a Ph.D. degree by September 2004.

Applicants should send their **curriculum vitae, including publications list, and have at least three letters of recommendation** sent to the following address as soon as possible:

**2004-05 Temporary Faculty Search Committee
Department of Mathematics,
University of California, Riverside
Riverside, CA 92521-0135**

Review of applications will begin on May 10, 2004 and will continue until the position(s) is filled. The University of California, Riverside is an Affirmative Action/Equal Opportunity Employer. Inquiries (not applications) can be sent to Adele@Math.ucr.edu.

AWM WORKSHOP: Focus on Research & Career Experiences

held in conjunction the 2004 SIAM Annual Meeting (July 12-16, 2004)
Oregon Convention Center, Portland, Oregon

SCHEDULE as of April 30, 2004

The Association for Women in Mathematics (AWM) plans a workshop from Monday mid-day through Tuesday, July 12-13, 2004. These events are held in conjunction with the the 2004 SIAM Annual Meeting and the 2004 SIAM Conference on the Life Sciences at the Oregon Convention Center in Portland, Oregon, July 12-15, 2004. AWM and SIAM welcomes your participation.

The sessions focus on showcasing the research of women graduate students and recent Ph.D. mathematicians and helping individuals to prepare for careers in the mathematical sciences. Our Tuesday morning session is a minisymposium which focuses on career planning and experiences. The workshop also has two research minisymposia (Monday afternoon and Tuesday afternoon) presented by recent Ph.D. mathematicians and poster presentations by graduate students. **In addition, on Tuesday, July 13, 2004, (3:00 p.m.) there is the AWM-SIAM Sonia Kovalevsky Lecture on "Interior Elastodynamics Inverse Problems: Creating shear wave speed images of tissue" presented by Joyce R. McLaughlin, Rensselaer Polytechnic Institute.**

There is NO registration fee for this AWM workshop. The minisymposia, poster session and award lecture are **open to all SIAM meeting attendees**. Pre-registration for the AWM luncheon is required. Individuals can inquire about availability by contacting the AWM Office, 4114 CSS Bldg., College Park, MD 20742; phone 301-405-7892 or email awm@math.umd.edu. For further information on the workshop, contact the workshop chair, Suzanne Lenhart (lenhart@math.utk.edu) or Dawn Wheeler at AWM (awm@math.umd.edu).

AWM is grateful to SIAM and their Meetings Department for all their efforts on behalf of the workshop and all AWM activities. AWM also wishes to thank all the AWM members who volunteered their time and expertise for these activities. A special thank you is extended to Professors Suzanne Lenhart (University of Tennessee and Oak Ridge National Laboratory), K. Renee Fister (Murray State University) and Maeve L. McCarthy (Murray State University) who kindly served as the 2004 Workshop co-organizers. AWM also wishes to express its gratitude to the Office of Naval Research (ONR) for their support of the AWM workshop.



LOCATION: [rooms location subject to change ↓]

Monday, July 12, 2004

C125/C126, Oregon Convention Center

12:30 p.m. - 2:00 p.m. AWM Luncheon

Luncheon speaker: "Opportunities at the IMA"

Doug Arnold, Director

Institute for Mathematics and its Applications, University of Minnesota

[see AWM staff on-site for ticket availability or email awm@math.umd.edu prior to the meeting]

A104, Oregon Convention Center

4:00 p.m. - 6:00 p.m. AWM Minisymposium on Mathematical Biology (MS9)

This minisymposium will feature talks by female Recent Ph.D.'s working in mathematical models with biological applications. The applications include prion populations and leukemia drug treatment, Two talks are related to genotyping and genome comparison.

Organizer: Suzanne M. Lenhart, University of Tennessee and Oak Ridge National Laboratory

4:00 p.m. "Probabilistic Error Bounds with Application to
Genotyping Microarray Design"

Vera Cherepinsky, Courant Institute, NYU & Yale University
Meredith L. Greer, Bates College

4:30 p.m. "A Mathematical Analysis of Prion Proliferation"

5:00 p.m. "Optimal Control for Drug Therapy in a Chronic
Myelogenous Leukemia (CML) model"

Seema Nanda, University of Tennessee

5:30 p.m. "Genome comparison allowing complex rearrangements"

Mariel Vazquez, University of California, Berkeley

- continued on next page -

AWM WORKSHOP: Focus on Research & Career Experiences

Tuesday, July 13, 2004

A104, Oregon Convention Center

10:00 a.m. - 12:00 p.m. **AWM Minisymposium on Career Questions and Potential Options (MS16)**

Questions and concerns exist about gender issues in academic and industrial settings. Issues that will be discussed will include personal and professional challenges that arise as our careers progress. The speakers will give brief commentaries followed by a question and answer session.

Organizers: K. Renee Fister, Murray State University and Maeve L. McCarthy, Murray State University

Speakers:

10:00 a.m. "Women in Academia: Is the Climate Chilly?"

Barbara Lee Keyfitz, University of Houston

10:30 a.m. "Children versus Tenure"

Lisette de Pillis, Harvey Mudd College

11:00 a.m. "Career Challenges for the Female Mathematicians in Academia"

Martha L. Abell, Georgia Southern University

11:30 a.m. "The Administrative Career Track: Pros, Cons, and Factors"

Carol S. Woodward, Lawrence Livermore National Laboratory

Oregon Ballroom 202, Oregon Convention Center

3:00 p.m. - 3:30 p.m. **AWM-SIAM Sonia Kovalevsky Lecture (IP0)**

Title: "Interior Elastodynamics Inverse Problems: Creating shear wave speed images of tissue"

Speaker: Joyce R. McLaughlin, Rensselaer Polytechnic Institute

Abstract: The palpation exam, where the doctor presses against the skin to locate abnormal tissue, senses tissue stiffness changes. We create images of shear stiffness changes using data from Mathias Fink's transient elastography experiment. That experiment yields time and space dependent interior displacements of a propagating elastic wave using an ultrafast ultrasound based imaging technique. In this talk, we present well-posedness results, algorithms and images utilizing positions of the propagating front of the wave.

A104, Oregon Convention Center

4:00 p.m. - 6:00 p.m. **AWM Minisymposium on Modeling and Numerical Methods (MS22)**

This minisymposium will feature talks by female recent Ph.D.'s on modeling applications of mathematics, dynamics and numerical methods. The applications include relaxor ferroelectrics and transmembrane protein structure. Post-processing for the discontinuous Galerkin Method will be presented. The dynamics of polygonal dual billiards will also be presented.

Organizer: Suzanne M. Lenhart, University of Tennessee and Oak Ridge National Laboratory

Speakers:4:00 p.m. *On Polygonal Dual Billiards In The Hyperbolic Plane*

Filiz Dogru, Grand Valley State University

4:30 p.m. *An Empirical Scoring Function for the Optimal Bundling of Transmembrane Helices*

Genetha Anne Gray, Sandia National Laboratories

5:00 p.m. *A Temperature-Dependent Model for Relaxor Ferroelectrics*

Julie K. Raye, Virginia Commonwealth University

5:30 p.m. *ENO type stencil choosing for one-sided post-processing for the discontinuous Galerkin method*

Jennifer K. Ryan, Oak Ridge National Laboratory

Exhibit Hall A - Center, Oregon Convention Center

8:00 p.m. - 10:00 p.m. **Poster and Dessert Reception (PP1)**

AWM Poster Presentations by Women Graduate Students will be part of the SIAM Poster and Dessert Reception on Tuesday evening, from 8:00 p.m. to 10:00 p.m. AWM invites all SIAM attendees to join us.

The AWM Women Graduate Student Presenters in this session are:

"Optimal Control of Swinging Elements in a Parabolic Competition Model"

Erika Asano, University of Tennessee

"Computational Eddy Current-Based Methods in Nondestructive Damage Detection"

Brandy A. Benedict, North Carolina State University

"Nonlinear Dynamics of Frontal Polymerization with Gel effect"

Donna M. G. Comissiong, Northwestern University

"Biological Computation and Information Processing in Biofilms"

Sarah C. Cunningham, University of California Santa Cruz

"Optimal Control of Hybrid Systems involving ODEs"

Wandi Ding, University of Tennessee

"Application of the Generalized Singular Value

Decomposition to Face Recognition"

Peg Howland, University of Minnesota

"Locally Divergence-Free Discontinuous Galerkin"

Fengyan Li, Brown University

Volunteers Needed: If you are interested in volunteering to help with the Workshop, contact Suzanne Lenhart, lenhart@math.utk.edu

Association for Women in Mathematics
2003/2004 MEMBERSHIP FORM

LAST NAME _____ FIRST NAME _____ M.I. _____
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AWM's membership year is from October 1st to September 30th. Please fill-in this information and return it along with your DUES to:
AWM Membership
 4114 Computer & Space Sciences Building
 University of Maryland
 College Park, MD 20742-2461
 The AWM Newsletter is published six times a year and is part of your membership. Any questions, contact AWM at awm@math.umd.edu; (301) 405-7892 or refer to our website at: <http://www.awm-math.org>

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MJ_04

INDIVIDUAL DUES SCHEDULE

Please check the appropriate membership category below. Make checks or money order payable to: **Association for Women in Mathematics**.
 NOTE: All checks must be drawn on U.S. Banks and be in U.S. Funds. AWM Membership year is **October 1st to September 30th**.

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