AWM
ASSOCIATION FOR WOMEN IN MATHEMATICS

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IN THIS ISSUE

President's Report

Congratulations All Around

A number of mathematicians well known to AWM members garnered significant honors and recognition this spring, and I would like to wish them all congratulations. Many AWM members have already written to many of the recipients, but here are a few more good wishes, from me and on behalf of all of us. The kudos below appear in no particular order.

Susanne Brenner at the University of South Carolina received a Humboldt Research Award from the Alexander von Humboldt Foundation, which grants these awards annually to scientists and scholars from abroad with internationally recognized academic qualifications. The research award honors the academic achievements of the award winner's lifetime. Award winners are invited to carry out research projects of their own choice in Germany in cooperation with colleagues for periods of between six months and one year. It is the highest award given by the German government to non-German scientists and scholars in all disciplines. Susanne plans to visit the Humboldt University in Berlin, Hanover University, the University of Augsburg and the Max Planck Institute in Leipzig (with other university visits as well) in 2006. Congratulations, Sue, and enjoy your visit!

Congratulations to Linda Rothschild and Salah Baouendi, who are among the mathematicians, scientists, scholars, artists, civic, corporate and philanthropic leaders elected as Fellows of the American Academy of Arts and Sciences in 2005. The Academy, founded in 1780, is an international learned society located in Boston, MA. Linda is a former president of AWM. She and Salah are faculty members at UC San Diego. This is a significant honor and a well-deserved recognition.

Margaret Wright, current chair of the Computer Science Department of New York University, former president of SIAM and major supporter of women's participation in mathematical sciences, was elected to the National Academy of Sciences this year. Margaret has served in many society and mathematics community offices,

AWM
ASSOCIATION FOR WOMEN IN MATHEMATICS

The purpose of the Association for Women in Mathematics is

- to encourage women and girls to study and to have active careers in the mathematical sciences, and
- to promote equal opportunity and the equal treatment of women and girls in the mathematical sciences.

AWM was founded in 1971 at the Joint Meetings in Atlantic City.

The *Newsletter* is published bi-monthly. Articles, letters to the editor, and announcements are welcome.

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and she is reliably the person who will point out, always politely but in a tone that will not be denied, when a committee, award or speaker list does not have its fair share of women. Many of us owe our opportunities to participate in scientific and community leadership to a nudge from Margaret to the right people that we were qualified and available. She is a tireless promoter of everyone except herself, and it's a triumph to see that the National Academy has honored her. Congratulations, Margaret, from all of us.

Two of our members who have done so much for AWM have been recognized with Presidential Awards for Excellence in Science, Mathematics and Engineering Mentoring (PAESMEM). These awards include a $10,000 grant for continued mentoring work. The PAESMEM program, administered by NSF, honors individuals and institutions that have enhanced the participation of underrepresented groups—such as women, minorities and people with disabilities—in science, mathematics and engineering education at all levels. LENORE BLUM and ELIZABETH YANIK are among only 87 people recognized since 1996 as "outstanding mentors in the United States, assuring that tomorrow's scientists and engineers will better represent the nation's diverse population."

Lenore Blum of Carnegie Mellon University was cited for helping pioneer the Expanding Your Horizons program at Mills College in 1973 and for increasing the number of female computer science majors at Carnegie Mellon five-fold from 1995 to 1999.

Elizabeth Yanik of Emporia State University (Kansas) "is considered a passionate teacher who directs and sustains a half dozen mentoring programs at the school. Her MASTER IT program is a week long residential summer program engaging girls [grades 8 and 9] in mathematics and science activities on the ESU campus. Her Interdisciplinary Science and Mathematics provides ESU students with opportunities for early research experiences. Participants include students majoring in biological sciences, physical sciences, mathematics and computer science."

Lenore, of course, is a former president of AWM, and Betsy serves on the Education Committee. Wonderful news, Lenore and Betsy. We understand that you get your pictures taken with the President, and we hope you will remember to get permission to reprint the pictures in the AWM *Newsletter.*

At the end of May, I had an unexpected opportunity: I was invited to attend the Abel Prize Ceremony in Oslo, Norway, to see my thesis advisor, PETER LAX, receive the 2005 Abel Prize. I am grateful to Ragni Piene of the University of Oslo for organizing this invitation. Ragni is an algebraic geometer, a member of the Executive Committee of the IMU and one of the two women members of the mathematics section of the Norwegian Academy of Science and Letters (of which more later). This prize was endowed three years ago by the Norwegian government; the first winner was Jean Pierre Serre, and Sir Michael Atiyah and Isaac Singer won it last year. The mission of the Abel Foundation, which awards the prize, is interesting: motivated by the fact that fewer and fewer young people are choosing careers in mathematics and science, the foundation was established in the name of one of Norway's most

renowned scientists, Nils Hendrick Abel, who lived from 1803 to 1829 and was the first developer of what has come to be known as Galois theory (after another mathematician who died tragically young). As part of the visit, I watched a play about Abel's high school days, and the discovery of his genius by a dedicated teacher. The foundation has recently established the Holmboe Prize in the name of that teacher. I also met three high school students who had just competed for another prize in the name of Abel and who will go on to the International Mathematical Olympiad. At a lunch for the laureates, Professor Inger Moen, a former president of the Academy (and the only woman who has ever been president), welcomed the young people and hoped that they will someday improve the gender balance in mathematics in the academy (two out of 25 members are women) as well as at the universities in Norway.

The prize ceremony itself was most impressive. It included a wreath-laying at the monument to Abel in the city park, a presentation at the Aula of the University (a beautiful room decorated with murals by Edvard Munch) by the Crown Prince Regent of Norway, and a state dinner at the historical royal palace above the harbor. Queen Sonia was very skilled at making her socially awkward mathematical guests feel welcome and seemed as pleased to meet women mathematicians as we were to meet a queen. There were two days of mathematical talks. I attended the first, in Oslo, but missed the second, in Bergen. However, at the invitation of Petter Bjorstad, who organized the Bergen conference, I was able to send congratulations to Peter Lax on behalf of AWM. The Executive Committee noted that the twelve of us include two people, Fern Hunt and myself, who studied with Peter. Here is what we wrote:

> On behalf of the Association for Women in Mathematics I congratulate Peter Lax on the award of the Abel Prize. Peter has worked tirelessly throughout his career not only for excellence but also for inclusiveness. Let me add a personal note. Peter Lax was my advisor and he has been a continuing source of inspiration to me, as well as to the entire mathematics community.
>
> Barbara Lee Keyfitz
> President, AWM

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Individual: $50 — Family (no newsletter): $30
Contributing: $100 — Retired, part-time: $25
Student, unemployed, developing nations: $15
Friend: $1000 — Benefactor: $2500
All foreign memberships: $8 additional for postage
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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 $12 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 Department, Loyola University, 6525 N. Sheridan Road, Chicago, IL 60626; e-mail: leggett@members.ams.org; phone: 773-508-3554; fax: 773-508-2123. Send all **book review** material to Marge Bayer, Math Department, University of Kansas, 405 Snow Hall, 1460 Jayhawk Boulevard, Lawrence, KS 66045-7523; e-mail: bayer@math.ku.edu; fax: 785-864-5255 and all **education column** material to Ginger Warfield, Math Department, University of Washington, Seattle, WA 98195; e-mail: warfield@math.washington.edu. Send everything else, **including ads and address changes**, to AWM, 11240 Waples Mill Road, Suite 200, Fairfax, VA 22030; phone: 703-934-0163; fax: 703-359-7562; e-mail: awm@awm-math.org

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AWM DEADLINES

Sonia Kovalevsky High School Mathematics Days: August 4, 2005

AWM Workshop, January 2006: September 1, 2005

NSF-AWM Travel Grant: October 1, 2005 and February 1, 2006 *(pending funding)*

Schafer Prize, January 2006: October 1, 2005

Noether Lecturer nominations for 2007: October 15, 2005

AWM Essay Contest: October 24, 2005

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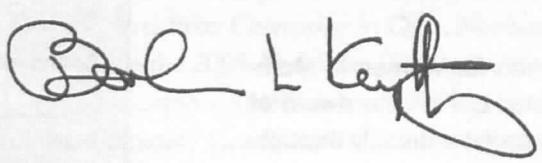
In January, CAROLYN MAHONEY was named the eighteenth president of Lincoln University of Missouri. At the time, she was Provost and Vice Chancellor for Elizabeth City, NC; she was one of the original twelve founding faculty at California State University San Marcos, where she spent the decade of the '90s. Mahoney delivered the first Annual Etta Z. Falconer Mathematics Lecture at Spelman College in March; her topic was "Secondary Mathematics from an Advanced Perspective." We're proud of you, Carolyn!

Finally, last week I was honored to win a prize of my own: the Krieger-Nelson Lecture Award of the Canadian Mathematical Society. This award has been given since 1995, and a description and complete list of winners may be found at camel.math.ca/Prizes/info/kn.html. I will single out Cathleen Morawetz, who won the prize in 1997 and who was also an Emmy Noether lecturer at the ICM in 1998. The prize honors the names of Cecilia Krieger and Evelyn Nelson. Cecilia Krieger was the third person and first woman to earn a Ph.D. in Canada. (We would be proud if that ratio had been maintained!) She taught at the University of Toronto until 1962, retiring just as I started college, so I never met her. But Cathleen Morawetz has warm memories of knowing her as a child growing up in Toronto, as well as when she was a student. And my aunt, whom I lived with during my first year of college, and who spent one year as a mathematics major before leaving college due to family responsibilities, remembers "Dr. Krieger" as a faculty member who helped and encouraged her. Evelyn Nelson, who was almost my exact contemporary, also studied at the University of Toronto and then completed her undergraduate degree at McMaster, in Hamilton, where she also earned a Ph.D. in 1970. She worked in semigroups and universal algebras, raised a family, and became a professor and eventually chair of the computer science unit in the mathematics department at McMaster. She died of cancer in her forties. I feel very honored to have received an award in the name of these two pioneer mathematical women in Canada. I am happy to have had the opportunity to give a lecture as a tribute to the path that they have blazed.



Barbara L. Keyfitz
Toronto, Canada
June 10, 2005

AWM Slate Announced!

We are pleased to announce the slate for this fall's AWM election. CATHY KESSEL has been nominated to serve as President-Elect. MAURA MAST (UMass Boston) has been nominated to continue her service as Clerk. MAGNHILD LIEN (Cal State Northridge), DAWN LOTT (Delaware State), ALICE SILVERBERG (UC Irvine), MARGARET SYMINGTON (Georgia Tech), ABIGAIL THOMPSON (UC Davis), and ELIZABETH YANIK (Emporia State) have accepted nominations for Member-at-Large; four will be elected.

Nominations by petition signed by 15 members are due to our president by **September 1, 2005**.

Thanks to the Nominating Committee (Suzanne Lenhart, chair, Helen Grundman, Vicki Howle, Dorina Mitrea and Linda Rothschild) for their efforts in producing this fine slate of candidates.

AWM Essay Contest

Congratulations to all the winners of the 2004 AWM Essay Contest: Biographies of Contemporary Women in Mathematics! The Grand Prize went to "I Apply Computational Mathematics to Understand the Natural World: Dr. Margot Gerritsen" by SAMANTHA VAN ANH TRAN, Presentation High School, San Jose, CA. Winners at the college level were: 1st Place, "Delving into Bioinformatics: Dr. Susan B. Davidson, Professor of Computer and Information Science" by STEFANIE COFORIO, Hartwick College, Oneonta, NY and Honorable Mention, "My Teacher, My Mentor: Mrs. S." by TZIPORA HENIG, Bar-Ilan University, Israel; "Marcella Jones: Diversity in Mathematics" by HEATHER PAULSON, Minneapolis Community and Technical College/Hamline University, Minneapolis, MN. For grades 9–12, the winners were: 1st Place, "I Apply Computational Mathematics to Understand the Natural World: Dr. Margot Gerritsen" by Samantha Van Anh Tran, Presentation High School, San Jose, CA. and Honorable Mention, "Dr. Olga Koroleva: Swarming the Field of Mathematics" by DIANA JUE, Westridge School for Girls, Los Angeles, CA. The Grade 6–8 winners were: 1st Place, "From Neural Networks to Mentor Networks: Dr. Mary Poulton Teaches Connections" by MALLORY BROWN, St. Gregory College Preparatory School, Tucson, AZ and Honorable Mention, "A Mathematician Receives a Warm Welcome in a Free Society: Dr. Tatiana Shubin" by JACQUELINE MY ANH TRAN, Chaboya Middle School, San Jose, CA.

The Grand Prize essay follows this announcement. All the prize-winning essays may be read at http://www.awm-math.org/biographies/contest/2004.html.

I Apply Computational Mathematics to Understand the Natural World: Dr. Margot Gerritsen

Samantha Van Anh Tran

Dr. Margot Gerritsen's cultural, family, and educational background has molded her life and made her the successful person she has become. She was born and raised in Goes, a small, well-structured Dutch village, in the Southwest of Holland. Growing up in a Catholic family, where both her grandfathers and her father were teachers, she developed a deep interest in teaching at an early age because teaching was "always a part of her family." She started tutoring other students at the age of twelve. While she always wanted to be a teacher, she was uncertain at what level or in what field she would teach. Her teaching experience gradually evolved into teaching small classes while in high school and has resulted in her becoming a tenure-track assistant professor in the Department of Petroleum Engineering at Stanford University.

Her family strongly emphasized education and expected that she and her two siblings would do well in school. She had a strong aptitude in mathematics and a desire to be the best at whatever she did. In grade school, her teachers gave structured math quizzes. She always strove to be the best by finishing the quiz first with a perfect score. At this young age, she had already developed a strong competitive edge that helped her succeed. Her inspiration to do mathematics comes from self-motivation.

As her studies continued in mathematics, she realized that pure mathematics as compared to applied mathematics did not capture her full interest. She developed a deep passion for real-world problem solving using the methods and techniques of applied mathematics. She found that she was able to model significant problems and obtain realistic solutions. Because she always loved "puzzles" and was intrigued by real-world problems, it was natural for her to identify and solve such problems with an engineering problem-solving approach.

Dr. Gerritsen's strong pre-college educational background prepared her for both undergraduate and graduate studies. She attended a Catholic co-ed high school where she participated in the six-year science track beginning in seventh grade. Going on to her undergraduate and master's-level graduate studies, she wasn't sure what area or major to go into, so she chose applied mathematics because of its usefulness in solving engineering problems. She chose this field of concentration to keep the doors of opportunity wide open. She attended the Delft University of Technology, a traditional, male-dominated university of engineering and technology, where only six percent of the student body was female. In a class of 200 students, it was common for her to be one out of two or three women in a course. She obtained her Master's of Science degree in applied mathematics from the Delft University of Technology.

She left the Netherlands in 1990 to go to "sunnier and hillier places" in the United States. She obtained her Ph.D. in Scientific Computing and Computational Mathematics with a minor in mechanical engineering at Stanford University. When asked how she felt about learning and working in a male-dominated profession, she indicated that she never considered it a challenge. She stated, "I've always had many more male friends than female, and that started in high school already because I did all the sciences." Since then, she has often been the only professional woman in her work group or academic department. Again she stated, "I think very much so that if you don't dwell on it yourself, then it's actually no issue. I mean, of course, there are things that happen, but in both ways. Some things help and some things do not, but on the whole there is a good balance."

When I asked about her techniques for success, she answered: "First, I am usually stubborn and I never give up. Second, I tend to try to learn from my mistakes, and I am not afraid to ask questions. And third, I try always to be optimistic and accept my imperfections, so I never generally feel trapped or give blame to others." She believes students should be self-motivated to learn and develop abilities to think and solve problems critically, independently, and analytically. She feels that in order to succeed in college, as well as in life, one must be creative and think "outside of the box" in order to understand and fully grasp the "bigger picture."

Dr. Gerritsen uses five key principles in most of her work. First, a physical understanding of the given problem, including an understanding of cause-and-effect relationships, must be obtained. Second, a mathematical model must be specified and built in order to fully comprehend and visualize the problem. Third, approximations of the mathematical equations must be specified. Fourth, the appropriate numerical methods must be applied to obtain simulation results. And fifth, tests must be performed and repeated to obtain the data required to formulate a realistic conclusion about the modeling effort. She believes that people tend to dive into the mathematical modeling too quickly without adequately understanding the underlying physics. Understanding the relevant physics is the most challenging step. She believes that more and better collaboration and interdisciplinary problem solving is required to successfully attack significant real-world problems.

Dr. Gerritsen lives her everyday life according to one Dutch saying: *Geniet het leven, benut het leven. Het vliegt voorbij en duurt maar oven.* This motto literally means: "Enjoy life, get most out of life. It will fly quickly and will last only a little while." Three recent events have driven her to try to live the spirit of this saying: the birth of her four-year-old son, Callum; a near-tragic emergency airplane landing in 2002 which resulted in a passenger's death due to a heart attack; and the sudden death of her father, who was the main pillar in her life. Because she was so close to her father, his death made her realize how quickly everything could end. She said, "It's these life-defining moments that put everything into perspective." When asked what the term "lifelong learning" means, Dr. Gerritsen answered with: "Every day is a big, long learning experience. I think the more you learn, the more you know what you don't know." She believes that "the further along you get in your education and the longer you work, the more you see there's so much that still needs to be discovered and so many things are not clear."

Today, she is a tenure-track assistant professor in the Department of Petroleum Engineering at Stanford University,

but considers herself to be "more of a fluid dynamicist than a petroleum engineer." Her main research is "the design and analysis of efficient numerical methods for solving partial differential equations that model processes in fluid dynamics." Her current research projects, aided by the use of computational mathematics enhanced by ever-evolving computer technology and software, are significant to society.

Examples are her involvement in the Stanford Yacht Research Group study that led to "The Flight of the Nyctosaurus" (with Jim Cunningham and John Conway) and a related project with The National Geographic Society. A nyctosaurus is a pterosaur or a flying reptile that lived about 80 to 85 million years ago. It had a large head crest that resembled the mast-boom-sail combination of a raked-back windsurfer. When a friend asked her to examine the effect that its big head crest may have had on the flight of this reptile, she became intrigued with pterosaurs and their flight. She is currently constructing physical replicas of this creature and other pterosaurs to analyze their form and function. The National Geographic project is about a much larger and older pterosaur called the African pterosaur, with a wingspan of five meters. This project is also the backbone of a National Geographic Society movie that will be released in early 2006. The goal of the project is to build a full-scale functional model that truly mimics the flight characteristics of a pterosaur. In addition to co-managing the project, her technical contributions are modeling and computing the flow capacities of the beast. She hopes the research conducted in this project will help advance the understanding of membrane flight, which may lead to innovative aircraft design. The project has enabled her to set up a summer program for high school students, allowing them to aid in the construction and simulation of the model replicas.

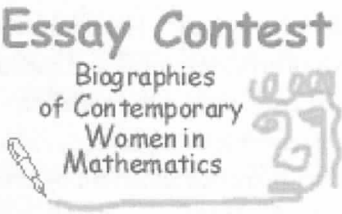
Another area of her research involves studies of subsurface oil reservoirs. A major problem of such reservoirs is that much of the oil is extremely difficult to recover. Gas injection can be used to enhance oil recovery but it is expensive, and a good simulation model of gas and oil flow is needed. She is developing the computational algorithms that enable more accurate performance predictions. The simulation of gas and oil flow in a mathematical model of an oil reservoir is a major computational challenge. Dr. Gerritsen applies partial differential equations in computational models to help the oil industry be more efficient, so that our country can decrease its dependence on foreign oil sources. Through her research she hopes to improve the understanding of fluid flow processes in oil reservoirs.

Five major areas in which she has published refereed papers are sailing, paleontology, oil reservoir modeling, coastal ocean modeling, and simulation of flow in shallow coastal regions. Her long-term goal is to apply computational mathematics to improve our understanding of the physics of the natural world.

Dr. Gerritsen serves as a Faculty Advisor for the Stanford chapter of the Society for Industrial and Applied Mathematics in America (SIAM). Outside of her professional work, she has many interests and hobbies. She likes playing with her son Callum, biking, hiking, swimming, scuba diving, gardening, sewing, knitting, reading, listening to music, and weightlifting (but not as much as when she was a weightlifting instructor).

Through her many struggles and accomplishments, she has grown into a much stronger person. The birth of her son, the death of her father, and the horrendous airplane experience were significant personal stepping-stones. Upon completion of her Ph.D. dissertation, "Designing an Efficient Solution Strategy for Fluid Flows," she has grown professionally, becoming the only woman on the faculty of the Department of Petroleum Engineering at Stanford University. She emphasizes that computational mathematics has become quite a mature field because of advances in computer technology and software. Today, much more complex models can be constructed and exercised with appropriate visualizations that can enable a deeper understanding of physical structures and related phenomena. Dr. Gerritsen hopes to continue making cutting-edge contributions to interdisciplinary research and problem solving with a particular emphasis in the challenging field of fluid dynamics.

About the student author:
My name is Samantha Van Anh Tran, and I am an eleventh grade student at Presentation High School in San José, California—an all-girls high school. My favorite subjects are mathematics and the sciences. I am a first generation Vietnamese-American: my parents immigrated to the United States from Vietnam after the fall of Saigon. At last year's Synopsys Silicon Valley Science and Technology Championship, I won the grand prize in the physical sciences division for my project, "The Physical Chemistry of the Ice Spike Phenomena." This enabled me to exhibit my project at both the California State Science Fair and the Intel International Science and Engineering Fair (ISEF). I received the Achievement Award in Atmospheric Sciences from the American Meteorological Society for my project.



To increase awareness of women's ongoing contributions to the mathematical sciences, the AWM is (*pending funding*) sponsoring an essay contest for biographies of contemporary women mathematicians and statisticians in academic, industrial, and government careers.

The essays will be based primarily on an interview with a woman currently working in a mathematical career. This contest is open to students in the following categories: **grades 6–8**, **grades 9–12**, and **undergraduate**. At least one winning entry will be chosen from each category. Winners will receive a prize, and their essays will be published online at the AWM website. Additionally, a grand prize winner will have his or her entry published in the AWM *Newsletter*. For more information, contact Dr. Victoria Howle (the contest organizer) at vehowle@sandia.gov or see the contest web page: www.awm-math.org/biographies/contest.html. The deadline for receipt of entries is **October 24, 2005**. *(To volunteer as an interview subject, contact Howle at the e-mail address given.)*

Lessons on Learning from the Women of MIT

Barbara Henke, middle school math teacher,
Green Brook, NJ

The Research Question

Why do some young women rise to meet the challenges of an ever-evolving planet, while others avoid the challenge of nightly homework, especially when it involves math? This was the question that aroused the curiosity of those who probed the backgrounds of the women of MIT, both current students and recent graduates, searching for the factors that directed and/or supported their success in gaining acceptance to this elite school for math, science, and technology. The objective was to take that information, understand it, categorize it, and share it in ways that would support and encourage younger females in their studies of math and science.

The Research Design

The research design for this study divided the pre-college experiences of the participants into three major categories: home life, school, and community. Twenty-four interviews were conducted over a period of eight weeks spanning two years, or two major interviewing periods. Roughly half of the interviews were videotaped, and the remaining ones were responses to e-mail questionnaires. Follow-up face-to-face interviews were conducted to obtain additional information. Respondents shared information that was comfortable to them, so some questionnaire queries went unanswered.

Parents' Commitment to Education

The interviewees said it was consistent support from their families from birth to age eighteen that made the most impact. It was parents who didn't give up when their girls ran into academic difficulty. The work ethic was so ingrained in the fabric of these students' lives that they were unshakable in talking about it, and they knew that their work ethic originated in the home. Parental commitment to their child's education included real financial sacrifices as well. Working extra jobs, canceling the family vacation, or mortgaging the family home to pay tuition were not uncommon sacrifices. School was the child's job, and she was expected to be a productive member of the family. As a producer, the child was respected for this contribution. She learned to feel valued for her work and to seek additional venues for her talents.

In a number of cases, respondents mentioned that their parents set out an agenda for academics well beyond what the schools (many public) were requiring. This parallel home curriculum further emphasized that education occurred both inside and outside of school. Not only did they not allow excuses from their children, they allowed no excuses for themselves either.

Student's Level of Coping Skills

None of our interviewees recounted knowing that they were skilled at coping, at least in those terms. However, when asked about valuable learning experiences, they were quick to point out those with coping aspects. Events that taught the coping skill to two interviewees followed a similar path: at the critical moment when these women were at their most fearful, a parent stepped in with a vision and a plan to get through the difficulty at hand and stuck by it until it was completed.

Margie told us how she was honored with an opportunity to spend a summer at a technology camp away from home prior to her eighth grade year. Excited to go, she soon felt differently awakening some 800 miles from home. A tearful Margie had just about convinced her fearful father to come and get her when her mother got on the phone and without reservation told Margie she was staying, so she should make the best of the situation. Mother sternly reminded Margie of her commitment to completing the assignment, but rewarded her daughter by expressing her confidence that Margie would succeed at summer camp; she wouldn't budge on letting her come home. Margie finished camp that summer and came home with vastly improved coping skills.

Margie, as a young adult, looked back on that experience with two distinct memories. First, she recalled that through her mother's confidence in her to fulfill the mission, she found courage deep within herself to get past the loneliness and make the best of things, thus building confidence in herself. Secondly, she noted that her confidence was once again needed three years later when she accepted an invitation to study in Europe for a full school year. She said, "Because my mom believed I could do it, so did I."

Margie's story is by no means unique. J-J's mom didn't think her daughter was challenged enough in public school, so she moved her to a private school early in her elementary years. Still unchallenged, J-J was again moved in seventh grade to a demanding prep school, one of the most demanding private schools in her state. J-J soon found her easy A's dropping to B's until they were dangerously close to C's, something J-J had never seen on her report card. Tearful and defeated and somewhat angry that she could no longer shoot pool in the lounge during her study hall period, J-J had no answers.

Her mom stepped in and laid out a plan to turn things around for her daunted daughter. For the next three months J-J had to share her daily class work and homework with her mom. Tired from her own job, Mom listened nightly as J-J went through each and every lesson from the day, often teaching the lessons while Mom dozed off in the easy chair, still with one eye open and half an ear listening at every prolonged pause. She also had J-J keep track of her grades and assignments in a planner that was checked nightly. The next report card came home wrapped in the sweet smell of success. J-J regained her pool hall privileges, and Mother regained her own evenings!

In an interview J-J recalled that she was terribly frightened that she was failing with no way to stop it. She had never needed to develop higher level studying skills before, as she had previously breezed comfortably through school. She gives credit to the plan devised by her mother with showing her a way to get the job done, as well as helping her develop coping skills. From that day forward, J-J barreled through middle and high school, graduating near the top of her prep school class. She kept rolling right through three degrees at MIT, and never again needed academic help from her mother.

These mothers taught their daughters to cope. At this writing both of these women have entered the work force in their chosen careers and bring home near six figure annual incomes.

Early Experiences with Math

These MIT women learned to like math before they had a chance to learn not to. Positive initial experiences with math and science occurred both at home and at school. Girls who learned to measure and sew doll clothes beside a loving grandma, measure spices for gingerbread cookies with mom, play math computer games in their spare time, or calculate the cost of a back-to-school wardrobe with a best friend all learned math in comfortable ways. Whether those experiences came from games (frequently cited by the interviewees), tools such as microscopes, or real-world applications, the more, the better. Learning math in school was comfortable after using the same math in these familiar situations for years.

Not one of our interviewees noted a completely negative math experience as their first. The content and delivery of early math experiences seems to be crucial to developing emerging math-minded females.

Student's Global Awareness

Helping to solve the world's problems is quite a leap from earning good grades on a report card. Parents of these MIT women showed them the world beyond the town line. Although many parents might encourage their children to do their best in school in order to get good jobs, MIT parents supported their children's getting top-flight educations so that they might have a positive impact on the planet. Lifestyle was not the educational objective of these parents. Their daughters became motivated by the challenge to improve their world.

At dinner many parents might merely ask their young scholars: "How was your day, dear?" Instead, these forward-looking parents asked questions like: "What did you learn today, and how can you apply it to tomorrow's problems to make the greatest impact?" By asking these questions, the parents set up conversations that led their daughters to a vision of tomorrow, to making the connection between what was being learned in school and how to contribute to the future in many beneficial ways.

When students ask, "Why am I learning this or that?" the MIT women knew the answer far better than most. These women knew a real world, not a media world, and they knew the possibilities available to them. They worked steadily to find their way into the work of their choosing, work often making a far-reaching contribution.

The Conclusion

The MIT interviewees were enthusiastic as they told stories from their backgrounds and upbringings, believing their experiences could benefit younger women considering a future in math, science, or technology. Collectively, they spoke of the unrelenting efforts of their families to develop an unwavering work ethic and to foster coping skills. They noted early and pleasurable experiences with math in non-threatening environments. Finally, they described a tantalizing invitation to the wider world by parents who believed their daughters could have impact on a global scale.

Women in Science Press Conference

MentorNet press release

Thousands Sign Letter Asking Senators to Increase Women's Participation in Science and Engineering

In the United States, women account for barely 10 percent of all engineers and just 34 percent of all scientists. Greater awareness of the current underrepresentation of women in science, technology, engineering, and mathematics is important to advance women's participation in these fields; we need to examine the factors that play a role in the issue.

On May 11, 2005, at a press conference on Capitol Hill, a coalition of organizations and individuals presented Senators Ron Wyden (D-OR) and George Allen (R-VA) a letter encouraging Congress to take action to advance women's full participation in science, technology, engineering, and mathematics. The letter outlines the issues and the efforts that must be taken to increase the numbers of all women entering these fields.

"Over 6,000 individuals have signed the letter," said Carol Muller, CEO of the non-profit MentorNet, one of the organizations involved in bringing together the signers on this issue. "We must continue to take action to reverse the underrepresentation of women in these fields and to increase their opportunities. We must act now because our nation runs the risk of losing leadership in these fields."

Joining the CEO of MentorNet in presenting the letter to Senators Wyden and Allen were representatives of the National Women's Law Center, the Association for Women in Science, the Society of Women Engineers, the Women in Engineering Programs & Advocates Network, the International Network of Women Engineers and Scientists, Engineers Week, the Center for Women in Information Technology, the Anita Borg Institute for Women and Technology, the National Center for Women & Information Technology, the Association for Women in Mathematics [Cora Sadosky, past AWM president, Howard University, represented us], the Commission on Professionals in Science and Technology, Girls Inc., the Institute of Electrical and Electronics Engineers, and numerous others.

The text of the letter follows.

As a group of concerned scientists, mathematicians, engineers, professors, and students in these disciplines, we are asking you both, and Congress, to embark on a broad-ranging inquiry to increase opportunities for women in the sciences, mathematics and engineering. The recent debate over women's role in math and science has helped shed light on the persistent under-representation of women in these important fields. Now, more than ever, our nation will rely upon its scientists, mathematicians, and engineers for its economic health and national security. As the Senators who chaired hearings on women in science in the Science, Technology, and Space Subcommittee of the Senate Commerce Committee, you can appreciate the negative ramifications of having one-half of our nation's population removed from the fields of math and science.

Congress must undertake efforts to increase the numbers of all women entering the fields of math, science and engineering in our country, and should examine the myriad factors that may play roles in this issue. An in-depth investigation of the problem should include the cultural factors and economic factors affecting women in these fields, possible gender discrimination in these areas, federal laws that may help address any inequities, including Title IX of the Education Act, and specific actions that may help increase opportunities for women, such as more fellowships in these disciplines, increased mentoring for women, and an increased understanding of the need for more women in these fields.

Unless we act now, on a national level, to address the lack of women in math and science, our nation runs the risk not only of losing its technological prowess, but its national security as well.

About MentorNet

In the March–April issue of this *Newsletter,* Carolyn Gordon mistakenly referred to AWM's Mentor Network as MentorNet is her closing report on her presidency. Our apologies to the real MentorNet! Although we have included information on this fine organization in the newsletter in the past, we remind you about them here.

MentorNet (website: www.MentorNet.net), currently headquartered in San José, CA, is a nonprofit 501(c)(3) organization working to further the progress of women and others underrepresented in scientific and technical fields through the use of a dynamic, technology-supported mentoring network. MentorNet aims to advance individuals and society, and enhance engineering and related sciences, by promoting a diversified, expanded, and talented workforce. In partnership with colleges and universities, corporations, government labs and agencies, and professional societies, MentorNet is international in scope, serving students and professionals from all over the world. Major funding is provided by the Alcoa Foundation, AT&T Foundation, IBM, Intel Foundation, Cisco Systems, and Symantec.

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 sixteenth annual Schafer Prize will be awarded at the Joint Prize Session at the Joint Mathematics Meetings in San Antonio, Texas, January 2006.

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, 11240 Waples Mill Road, Suite 200, Fairfax, VA 22030. Nominations must be received by **October 1, 2005**. If you have questions, phone 703-934-0163, e-mail awm@awm-math.org, or visit www.awm-math.org. Nominations via e-mail or fax will not be accepted.

Education Column

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

It was in 1990 that I began to put into action a plan to expand my love of teaching mathematics into some knowledge about Mathematics Education as a field. My opening salvo was attending an MER (Mathematicians and Educational Reform) workshop. Most of the sessions were fascinating, but one of the optional ones caused me to give a delicate shudder: Assessment. How could any respectable person occupy their time with such a grungy topic?

I've come a long way since then. I've even become intrigued with, and played around with, a number of forms of classroom assessment, some of them modifications of the classic sit-down-and-shut-up test, some rather farther into left field. Simultaneously I have been aware of the assessment effects of the reauthorization of Title I of the Elementary and Secondary Education Act, which resulted in almost every state producing its own standards and assessments, and the cataclysmic impact of No Child Left Behind. These two have given me a constantly increasing awareness of the complexity and importance of large-scale assessment of the learning and teaching going on in schools statewide.

Recently the last remnants of that original reaction were erased, and I came to realize that there are people occupying themselves with assessment who are not merely respectable but stellar. Furthermore the rest of us owe them a great debt of gratitude. In the process of learning that, I also found out a number of details and connections that had hitherto eluded me. For me, the context is the state of Washington, but the issues involved are present in all 50 states. My impression (small attack of chauvinism) is that Washington's procedures were particularly exacting, and the number of people involved and degree of follow-through were also outstanding. This I leave to the reader to figure out by checking on his or her home state.

My source of all this information was a pair of talks by my colleague Catherine Taylor, who is a professor in the University of Washington's College of Education. Her field of specialty is assessment, and she has recently returned to campus after a three-year stint as adviser to the Office of the Superintendent of Public Instruction. She spoke first to a bunch of members of the mathematics department and then to a bunch of graduate students who have been working with K–12 teachers. Each group came in armed with many negative reactions to our state's current test, and in each the mood change was palpable. As one of my colleagues in the math department put it: "I'm a convert!"

So what was it we learned? It started with some prehistory: the original Title I Act. It was passed by Congress in the late sixties with the admirable intention of improving the education of underachieving poor students. Unfortunately it had some fatal flaws, such as a provision that each school must keep improving its students' test scores, but if the scores improved beyond a certain point the school would abruptly lose its funding. Eventually a study by John Cannell unearthed some dramatic findings—for instance, that test manipulations were managing to make the average performance in nearly all states be above the national average—and some unpleasant consequences of the format. The response to this was a 1993 reauthorization of Title I that mandated that states create their own academic standards and allowed them to choose or create their own assessment systems. The Washington legislature then set up a Commission on Student Learning (CSL) to address the task of producing both the standards and the assessment system. That's where things start getting impressive. The CSL didn't simply sit down and start writing. They assembled committees of educators and community members from throughout the state and used their input. From that they produced the Essential Academic Learning Requirements (EALRs—pronounced as if they had something to do with long, thin fish). Then they sent the proposed EALRs out for review by an even larger community and revised them based on the reviews. The EALRs form a careful, thoughtful set. In mathematics they strongly reflect the NCTM Standards, with an emphasis on understanding and using mathematics, with computational fluency to be based on understanding of the operations being computed with. They also feature the inclusion of problem-solving, mathematical reasoning, mathematical communication, and connections as part of the content standards.

And that, with all of its community consultation and review and multiple re-writings, was the easy part. After it

came the construction and management of the WASL (Washington Assessment of Student Learning). Catherine gave us a full page diagram of the steps and stages of that and filled in with further details. I lost track of the number of iterations of writing and reviewing and re-writing that went into it, but I do know that well over a year of work went into it before the first field test was run, and that's less than halfway down her page. Then came pilot testing and the huge job of figuring out the scoring. The test is criterion-referenced rather than norm-referenced, which means that instead of being designed to produce a bell-shaped curve of scores, it aims basically to establish whether students have reached a level of proficiency appropriate to their grade level. Given that the EALRs had established that proficiency to include reasoning and ability to communicate, pure multiple-choice testing was clearly out of the question. There are some multiple-choice items (I liked Catherine's example of "Which of the following pieces of information do you have to have in order to solve the problem you just read?"), but also short-answer questions, where the answer must include some form of justification, in words, pictures, graphs, diagrams or whatever else the student chooses to use, and extended-response questions that open out in many directions. Next a consistent scoring system was established, then data for items were analyzed to select those that would be used on future tests.

After the test was administered for the first time, a collection of people closely in touch with children of the relevant age took the test themselves and estimated where they would put the bar. Parents and teachers put it high, administrators put it low. Information about what percentage of the students who took the pilot test would be rated proficient given each of the bars was eventually released into the conversation, after which a suitable compromise took effect.

Meanwhile the test items were field-tested in a large number of school districts and then examined by experts (including Catherine) for all manner of biases. The check for cultural bias ran beyond academic expertise—folks from OSPI held fora within various ethnic communities and learned yet more. For instance, a Native American elder pointed out that children of his nation would not get as far as the mathematics of a problem based on a survey, because it is not in their culture to ask questions of a stranger. Catherine ran multitudinous statistical tests for bias and found, for instance, that on the short-answer questions girls and minorities were at a slight advantage, and on the multiple-choice question boys and whites were at a slight advantage, but the advantages balanced out.

The writing assessment specialist for Washington's Department of Education worked with the scoring contractor to set up a rigorous training system for scoring the tests, which is done by teachers hired for the purpose. Tests run on the resulting scores indicate an extremely high rate of consistency in grading. In short, this is a really classy assessment.

Then we get to the issue of public reaction. That's where the egg hits the fan. Partly, of course, that's because on any

Call for Nominations: The 2007 Noether Lecture

AWM established the Emmy Noether Lectures to honor women who have made fundamental and sustained contributions to the mathematical sciences. This one-hour expository lecture is presented at the Joint Mathematics Meetings each January. Emmy Noether was one of the great mathematicians of her time, someone who worked and struggled for what she loved and believed in. Her life and work remain a tremendous inspiration.

The mathematicians who have given the Noether lectures in the past are: Jessie MacWilliams, Olga Taussky Todd, Julia Robinson, Cathleen Morawetz, Mary Ellen Rudin, Jane Cronin Scanlon, Yvonne Choquet-Bruhat, Joan Birman, Karen Uhlenbeck, Mary Wheeler, Bhama Srinivasan, Alexandra Bellow, Nancy Kopell, Linda Keen, Lesley Sibner, Ol'ga Ladyzhenskaya, Judith Sally, Olga Oleinik, Linda Rothschild, Dusa McDuff, Krystyna Kuperberg, Margaret Wright, Sun-Yung Alice Chang, Lenore Blum, Jean Taylor, Svetlana Katok, and Lai-Sang Young.

The letter of nomination should include a one-page outline of the nominee's contribution to mathematics, giving four of her most important papers and other relevant information. *Five* copies of nominations should be sent by **October 15, 2005** to: The Noether Lecture Committee, Association for Women in Mathematics, 11240 Waples Mill Road, Suite 200, Fairfax, VA 22030. If you have questions, phone 703-934-0163 or e-mail awm@awm-math.org. Nominations via e-mail or fax will not be accepted.

issue the noise tends to come from the negative. Beyond that, though, are some deeper issues. A fundamental one is sheer unfamiliarity. Teachers inevitably teach to the test—the system pretty much demands it—and for many years most tests have been geared to speedy production of calculations. The WASL is designed to change the whole slant of the assessment, and not only is that disorienting, but also is very demanding of teachers. On the other hand, to whatever extent teaching to the test changes the slant of the teaching towards achieving the EALRs, the pain is offset by some genuine benefits. Less easy to offset is the incredible pressure put on schools, and thence teachers, by the high stakes introduced by the No Child Left Behind Act. Of course teachers shouldn't pass the stress along to their students, but it's very hard not to. And what parent likes to see a child quaking at the thought of a test?

With all this information rattling around in my head, I've been pondering what we as mathematicians, Washingtonian or not, can do. So far all I have been able to come up with is "Find out more." I propose this not simply as an intellectual exercise, but so that we who might actually be listened to have answers to questions like "My fourth grade son hasn't learned long division yet and I learned it in third—doesn't that mean he is getting less math?" [Answer: not if the time that would have been spent on the mechanics of division goes into its conceptual underpinnings] or "They used to put addition of fractions with unlike denominators on the fourth grade test and this one doesn't have anything nearly that advanced—isn't that a dumbing down?" [Answer: a norm-based test is designed to spread scores out along a curve, so it puts in questions that are way above and way below expectations in order to make distinctions among students who are far away from the norm.]

And, of course, my recurrent response to educational issues: stand by to support K–12 teachers in any way you can—they are a beleaguered population if ever there was one!

Addendum: Catherine very kindly proofread my original draft of this column and corrected the more egregious of my errors. She then produced a comment on my final paragraph that I liked so much that I shall now reproduce it, thus converting hers to the column's concluding paragraph:

Mathematicians should look at what is in the tests because what is tested is what will be taught. If they think that kids should learn to think mathematically or attack ill-structured problems with some confidence, be able to apply math concepts and procedures in real world situations, graph, diagram, etc., then they should be looking to see if that is what is being "valued" on their state's test. What is tested tells kids what is valued and what is tested tells them what it means to be a mathematician or to use mathematics. That's why our culture is so math phobic—we have a very skewed idea about what it means to do mathematics.

Women and Science Issues

Anne Leggett

The series of articles and letters begun in reaction to Lawrence Summers' remarks in February continues. Because the discussion is so wide-ranging, I have used a new title for the potpourri I'm including in this issue of the newsletter. Mucho thanks to the AWM email group (in particular, Lenore Blum, Bettye Anne Case, Judy Roitman, Alice Silverberg, and Erica Voolich) for providing references to many of the items below.

From the April 17, 2005, NY *Times Book* Review:

> To the Editor: The genetic inferiority of women is not a "controversial idea," as Rachel Donadio would have it, but old-fashioned prejudice. MICHAEL SHUB, Toronto

From the same issue of the NYT Review, page 18, "Sister Act," a review by Francine Prose of Megan Marshall's long-in-the-making bio *The Peabody Sisters:*

> Reading about these difficulties makes it clear both how much has changed and how much has stayed the same.... It's almost eerie, in the wake of the Lawrence Summers controversy, to encounter the words of an earlier Harvard president, John Kirkland, a "friend and mentor" of Elizabeth's, who advised her that if any woman "is raised by genius and knowledge above the level of her sex, her neglect of attentions called femininities, will more than counterbalance all her other advantages and reduce her below other women." With friends like these....

The National Symposium for the Advancement of Women in Science was held at Harvard in April. Steve Bradt, FAS Communications, reported on the conference organized by the undergraduate group Women in Science at Harvard-Radcliffe in the *Harvard University Gazette,* "Requisites for Success: Stamina, Boundary-setting." "What traits will help the next generation of women scientists succeed? According to top female scientists from the nation's universities, corporations, hospitals, research journals, and museums who spoke at a symposium held last week at Harvard, they include: zealous guarding of personal time, the ability to juggle numerous life tasks, and the willingness to sacrifice perfection. Oh, and a thick skin and sheer stamina don't hurt." See www.news.harvard.edu/gazette/2005/04.14/13-wise.html for the full article.

One of the speakers was AWM member Cathleen Morawetz, professor emerita at Courant Institute.

> Morawetz, a mother of four, initiated a discussion of the possibility for women scientists to also be mothers, saying she regrets that many women scientists feel compelled to forego motherhood. She said that sometimes her children have made all the more clear the importance of her pioneering role as a female mathematician: Once, when she was considering resigning a position on a board, her daughters implored her to remain, saying, "You have to keep the seat warm for the next generation of women."

Harvard President Lawrence H. Summers also spoke at the symposium.

> "Advancing women in science is an issue of great importance to the University and to our country," Summers said, adding that the best possible science requires recruiting from the widest possible pool of talent. "We live in a time where there is more potential for human advancement than at any time in history. The potential contributions of every possible scientist to science have never been more important."
>
> Summers pledged a Harvard commitment to women scientists that is "focused, intense, and above all, sustained."

John Derbyshire, in "Noether's Novelty: The greatest female mathematician of the 20th century, and maybe ever," *National Review Online,* April 21, 2005, [www.nationalreview.com/derbyshire/derbyshire200504210758.asp], has this to say:

> The aftershocks of the Lawrence Summers brouhaha ripple on. Summers, you may recall (well, it was several news cycles ago) scandalized the academic establishment by suggesting that the scarcity of female scientists and mathematicians might have its origins in the differing biologies of men and women. Our own Stanley Kurtz has a nice follow-up piece on the Summers flap in the current *City Journal.*
>
> Reading Stanley's piece, I got to thinking of Emmy Noether, who died just 70 years ago last week. I'm going to leave you to deduce what, if anything, you can from Emmy Noether's story. It's a story worth telling, in any case, so here it is.

He goes on to give an account of Noether's life, putting it "in the context of the German empire in which she grew up." Frankly, I don't have a clue what Derbyshire is hoping I will deduce from his telling of her story. It certainly makes clear the enormous difficulties she faced in pursuing her mathematics, and that she was a truly great mathematician. Absent his laudatory reference to "Can We Make Boys and Girls Alike?" by Stanley Kurtz, one might guess that Derbyshire is more sympathetic to our cause than he likely is. Kurtz's article [www.city-journal.org/ html/15_2_boys_girls.html] begins:

> When Lawrence Summers suggested that biology might be partially responsible for the relative rarity of female mathematics professors, he was provoking an academic giant. Powerful as the president of Harvard may be, his influence is as nothing compared with that of the behemoth that is the women's studies movement.

He then goes on at length about the horrors of "feminist orthodoxy," concluding with: "From either a biological or cultural point of view, then, the feminist project of androgyny is ultimately doomed.... In the end, gender won't disappear, whatever the mavens of women's studies hope, but the careers of some bright young men probably will." A large part of his argument is based on an analysis of the early kibbutz movement in Israel. The fact that parents, in particular mothers, wanted to be part of their childrens' lives for more than two

hours a day, seems unsurprising to me, and doesn't put a dent in my personal feminist beliefs. But then my personal feminism doesn't have androgyny as a goal, either.

Some may wonder why I'm devoting space to Kurtz's view of women's studies as a monolith of orthodoxy, where all share in the "feminist project of androgyny," when he is so clearly wrong-headed. But we do need to know what is going on in the circles in which he participates, given the way our country is run these days. In case you're wondering (I certainly was!), *City Journal* is a publication of the Manhattan Institute for Policy Research, a "think tank whose mission is to develop and disseminate new ideas that foster greater economic choice and individual responsibility." The sidebar "Eye on the News" of June 19 on the home page of www.city-journal.org includes two articles by Heather MacDonald, one titled "Pity Harvard's Oppressed Women Profs" (teaser: "Oh, how they suffer!") and the other "Harvard's Diversity Grovel" ("In earmarking $50 million for diversity, President Summers is throwing away more than money"). The teasers are enough for me, I've read as much of this nonsense as I care to, for today.

In contrast to the sometimes virulent caricatures of what feminists want that may be found in publications such as the above, Marcella Bombardieri of the *Boston Globe* continues to write articles that are sympathetic to our point of view. On May 1, "A woman's place in the lab: Harvard studies efforts to boost female faculty at U-Wisconsin" was published [www.boston.com/news/local/articles/2005/05/01/campus_strives_to_boost_female_faculty/]. It discusses the work of one of the task forces appointed by Summers, in particular focusing on efforts in the electrical and computer engineering department at the University of Wisconsin, Madison, to improve their record with women. This would not be difficult:

> In the late 1980s, a curmudgeonly male colleague locked the department's only female professor out of her lab, and no one in the department intervened until she appealed to senior campus administrators. Over the next dozen years, the department of 40 to 50 people hired only four more women, and two of them left before tenure.

Wisconsin's three-year-old Women in Science & Engineering Leadership Institute, funded by a grant from NSF, is an attempt to rectify this situation. Although officials at Wisconsin feel that it's too early to assess the impact of the institute,

> ...they do point to some signs of success. In the College of Engineering, only two of the 36 junior professors hired between 1999 and 2002 were women, or 6 percent. In the last two years, six of engineering's 14 hires, or 43 percent, were women, according to the institute's data.

Princeton University President Shirley M. Tilghman gave a lecture on March 24 to launch the ADVANCE Lecture Series at Columbia University's Earth Institute. I highly recommend reading the full lecture, available online at http://www.princeton.edu/main/news/archive/S11/21/06G40/index.xml?section=topstories. Here are some excerpts from her talk.

> [W]hen I accepted this invitation in the fall, I did not foresee that speaking as a university president on the subject of the underrepresentation of women in science and engineering would become a form of risk-taking behavior that makes bungee jumping and going over Niagara Falls in a barrel seem like child's play....
>
> I am not suggesting that women conduct scientific inquiry differently from men—the scientific method is universal—but it has been my own experience that the problems that intrigue women about the natural world are not always exactly the same as those that attract men. By encouraging women to embrace science, we likely increase the range of problems under study, and this will broaden and strengthen the entire enterprise....
>
> When we place a premium on creating an equitable and supportive environment for female students and scholars, when we empower women to fulfill their potential in science and engineering, and when the human face of these fields is diversified, we send a very powerful message all the way back to the wellhead. The message we communicate is this: women can and do excel in disciplines where men have long predominated....
>
> I attribute my own resistance to the stereotypical view that women are not meant to do science to four things: an extraordinary father who taught me that I could do anything I wanted, and "don't let anybody tell you differently," highly supportive mentors who happened to have been men, strong and inspirational senior women

> colleagues at the right times, and an absolute inability to recognize reality. Let me amplify the last point, which may be the least obvious. It has been my experience that many successful women in science simply fail to perceive that there are obstacles in their path. They are able to go through life with metaphorical blinders on—not that they would deny that there are forces working against the progress of women, but rather that they refuse to acknowledge that those forces apply to them....

She makes some important points in her remarks on what can be done, by universities as well as other employers. Many of us have observed that "the world works by lists," but have not worded it quite that succinctly. Many of us are also tired of reminding the world that we exist, but our need to be involved in making these lists is not likely to disappear anytime soon.

Good day care continues to be of paramount importance. So does extending the tenure clock. Princeton has offered one-year extensions and workload relief for new parents, both mothers and fathers, but discovered that men were using them more than women. Women "were afraid that requesting the extra year would be interpreted as a sign of weakness or lack of confidence." The solution? The extensions are now granted automatically.

"His Brain, Her Brain" by Larry Cahill appeared in the May 2005 *Scientific American* and is now available online at www.sciam.com/article.cfm?articleID=000363E3-1806-1264-980683414B7F0000. The teaser under the title reads: "It turns out that male and female brains differ quite a bit in architecture and activity. Research into these variations could lead to sex-specific treatments for disorders such as depression and schizophrenia." The article is quick to point out that these reported differences have little bearing on the debate reignited by Summers's remarks: "To date, no one has uncovered any evidence that anatomical disparities might render women incapable of achieving academic distinction in math, physics or engineering."

The article reviews several studies that claim that some differences between male and female brains are innate, not cultural. Some of these studies were conducted by Cahill and his colleagues; he is an assistant professor in the Department of Neurobiology and Behavior and the Center for the Neurobiology of Learning and Memory at UC, Irvine. He expresses strong convictions that sex differences must be considered when investigating treatments for psychological conditions, as others have emphasized with respect to medical studies. "Furthermore, the differences imply that researchers exploring the structure and function of the brain must take into account the sex of their subjects when analyzing their data—and include both women and men in future studies or risk obtaining misleading results."

A BBC News story posted May 11 at news.bbc.co.uk/go/pr/fr/-/1/hi/sci/tech/4534177.stm is titled "Women experts urged back to labs." It reports on a campaign of the UK Resource Centre for Women in SET (Science, Engineering and Technology), which "aims to help up to 1,000 women go back to the jobs for which they have been trained." Women who have left the SET workforce, for child-rearing and other purposes, often need to update their expertise to find an appropriate job when they wish to return to industry. The campaign aims to help women to address these issues. As part of this initiative, The Open University is offering a free online course, "Science, Engineering and Technology: A Course for Women Returners." The summary of the course at www3.open.ac.uk/courses/bin/p12.dll?C02T160 reads:

> If you are a woman who has studied or worked in either science, engineering or technology (SET) and you are looking to return to work in one of these sectors, then this course offers a supportive environment to help you realise your ambitions. Through a series of online activities including interactive lectures and discussions, you will analyse your previous experience, identify opportunities and develop a realistic and powerful action plan to enable you to find a job that will fulfil your aspirations and suit your lifestyle. As well as developing your skills and confidence, the course includes the chance to meet potential employers, role models and mentors in the world of SET.

AWM Workshop at MSRI

A workshop sponsored by AWM will be held at MSRI to celebrate the mathematical legacy of Olga Ladyzhenskaya and Olga Oleinik. It will take place from Thursday, May 18, to Saturday, May 20, 2006 at MSRI, Berkeley, CA. The workshop will feature invited lectures on the work of Ladyzhenskaya and Oleinik and on topics related to their interests. In addition, there will be panels on career development, leadership and mentoring, and contributed paper sessions on a variety of mathematical topics. Further details will appear in a forthcoming issue of the AWM *Newsletter.*

Why Women Shy away from Careers in Science and Math

press release, University of Michigan

Girls steer away from careers in math, science and engineering because they view science as a solitary rather than a social occupation, according to a University of Michigan psychologist.

"Raising girls who are confident in their ability to succeed in science and math is our first job," said Jacquelynne Eccles, a senior research professor at the U-M Institute for Social Research (ISR) and the U-M Institute for Research on Women and Gender.

"But in order to increase the number of women in science, we also need to make young women more interested in these fields, and that means making them aware that science is a social endeavor that involves working with and helping people."

Eccles gave an invited address on how parents and teachers influence children's academic and career choices April 9, 2005, in Atlanta at the biennial conference of the Society for Research in Child Development.

For the talk, she drew upon data from decades of research, funded by a variety of agencies and foundations, including the National Science Foundation and the National Institute of Child Health and Development. One of the studies Eccles used for the analysis was the Michigan Study of Adolescent and Adult Life Transitions, a longitudinal study she started in 1983 that has followed approximately 1,200 predominately white, working-class young men and women from early adolescence into adulthood. The last interviews were conducted in 2002 when participants were 30 years old.

In seventh grade, the occupational aspirations of girls had little to do with their abilities as indicated by their grades and the opinions of both their parents and their teachers, Eccles and colleagues found. The girls' perception of the career potential of advanced or honors math and science classes in high school was a stronger predictor of their selection of such courses than was their actual ability in those subjects.

Eccles and colleagues have repeatedly found that parents provide many types of messages to daughters that undermine both their daughters' confidence in their math and science abilities and their interest in pursuing careers in these fields.

Even though girls got better math grades than boys, parents of daughters reported that math was more difficult for their child than parents of sons. "Parents of daughters also said their girls had to work harder to do well in math than parents of sons, even though teachers told us this was not true," she said.

Girls said that they worked harder in math than in English, and parents reported that as true, too. But student time diaries told a different story, with boys and girls both reporting that they spent more time on language arts than on math.

"Parents also gave very different reasons for the math success of girls and boys," Eccles said. "Parents of boys rated talent and effort as equally important, while parents of girls said hard work was much more important than math talent."

Eccles urged teachers to tell parents that their daughters are talented in math and science, and to provide girls and their parents with vocational and intellectual reasons for studying math or science.

Eccles and colleagues also analyzed gender differences in college majors and occupations, finding that sex differences in general self-concepts and values at age 20 had a long-term influence on the college courses and jobs young men and women picked.

Young women were more likely than young men to place a high value on occupations that permitted flexibility and did not require them to be away from their family. The women also valued working with people. Even though young women had higher college GPAs than young men, young men were more likely to have a higher opinion of their abilities in math and science, and in their general intellectual abilities. They were also more likely to value jobs that required them to supervise other people.

"In addition to improving the confidence of girls, we need to show them that scientists work in teams, solving problems collaboratively. And that as a result of their work, scientists are in a unique position to help other people.

"We as a culture do a very bad job of telling our children what scientists do. Young people have an image of scientists as eccentric old men with wild hair, smoking cigars, deep in thought, alone. Basically, they think of Einstein. We need to change that image and give our children a much richer, nuanced view of who scientists are, what scientists do and how they work."

Book Review

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

Scrutinizing Feminist Epistemology: An Examination of Gender in Science, Cassandra L. Pinnick, Noretta Koertge, and Robert F. Almeder, eds., Rutgers University Press, 2003, ISBN 0813532264, 275 pages.

Reviewer: Judy Roitman, University of Kansas

By and large this book isn't written for us; it is written by philosophers for philosophers. By and large the reader is expected to be familiar with a wide range of contemporary philosophers (cf., on p. 305: "see, e.g., van Fraasen 1980; Hausman 1982; the essays in Churchland and Hooker 1984, especially that of Ellis; and Cordero 1989") and a wide range of philosophical terminology (cf., on p. 132, "Longino attempts to elucidate evidential relevance, as the positivists failed to do, and yet provide an understanding of evidence that makes the concept meaningful, as the wholists seem unable to do.") So reading this book is a little bit like overhearing an argument coming from a neighbor's apartment where the walls are thin enough that you can hear but not thin enough that you can hear clearly.

Furthermore, we are hearing only one side of the neighbor's argument (I will come back to that word), and the side we hear is very very loud.

A long time ago I wrote a review of Sandra Harding's *Whose Science, Whose Knowledge* for the AWM *Newsletter* because the *Newsletter* had reprinted a review of Harding's book from the journal Science which praised Harding's arguments. I had read Harding's book, and found it interesting, but I hadn't seen anything I would recognize as an argument, i.e., logical reasoning from explicit premises, and wanted to correct the record.[1]

The current book, largely written to refute (or is it attack?) Harding and her philosophical siblings (most of them women, but some of them men) also presents precious few arguments in the mathematical sense. Instead we have, with a few exceptions, a lot of arguments in the sit-com sense: people disagreeing with each other, often at the top of their lungs.

What are these people disagreeing about? And what does feminism have to do with epistemology anyway?[2]

Most of the readers of this newsletter are what is called "empirical feminists"—this is the formal stance of the AWM and similar organizations. The goal is equal treatment: we question the aspects of institutions that lead to inequities, but we tend to assume the common culture in which we are, or wish to be, embedded. E.g., we don't question the notion of proof in mathematics on feminist grounds.

Feminist epistemology does. It questions all kinds of things in scientific and mathematical methodologies, as well as other methodologies (e.g., history, social science ...). Not all feminist epistemologists agree—we should really talk about feminist epistemologies in the plural—but there are certain major themes (stated here with the names of leading proponents in parentheses):[3]

1. Standpoint (Sandra Harding):[4] all knowledge, including that in mathematics and the physical sciences, is grounded in specific social and historical contexts; different standpoints can lead to different theories, perceptions, and methodologies.

2. Metaphor (Evelyn Fox Keller): the dominant culture's metaphors are nearly invisible and serve the purposes of those in power; it is important to make them visible; furthermore, those not in the dominant class may have other, more fruitful metaphors.

3. Gender (Anne Fausto-Sterling): gender as a useful construct should be deeply questioned.[5]

[1] Harding is not alone in this: the Science review reflected the usual meaning of "argument," which differs from the mathematical meaning.

[2] For those who've forgotten their philosophical terminology: ontology asks what is; epistemology asks how you know what is.

[3] This outline reflects my own understandings and mis-understandings; that said, I would like to thank Joey Sprague for her helpful advice.

[4] "Standpoint" is a technical term; like many technical terms in philosophy, it is difficult to define. It should not be confused with uniformity of belief.

[5] This is sometimes mocked as theory run amok, but Fausto-Sterling comes to this conclusion from her study of genital and hormonal anomalies in babies, so it is grounded in very concrete physical reality.

4. Alternate methodologies (Carol Gilligan, Helen Longino): current methodologies or ways of valuing method may not be the most useful, and others are proposed.

In addition, some authors claim an advantage for the disadvantaged in rethinking scholarly discourse (see #1 and #2 above), but that is not a necessary corollary.

I do not claim to be widely read in the field, but what little I have read by feminist epistemologists I find stimulating. I often don't agree, but there is enough there to make me look a little harder at things. Should Ockham's Razor be so privileged? Are there grounds on which complexity can be valued? Can a feminist critique be useful in pointing out things we should be looking at that we are not? (Ape anthropology is an obvious example—not much attention was paid to the role of females in the troop before the most recent feminist movement.) What are the underlying metaphors that shape our perceptions?

As the book being reviewed points out, there are problems in much of this work. A major problem is lack of subject knowledge of science and/or mathematics, but feminist philosophers are not the only philosophers of mathematics or science who seem, to a practitioner, to miss the point or lack deep knowledge of the subject—even Wittgenstein has been accused of this. Many of the essays in this book do a good job of correcting the misperceptions of feminist epistemologists, but by and large they ignore or give short shrift to the more stimulating aspects of feminist epistemologies.

Furthermore, to judge from this book, many of the critiques of feminist epistemologies themselves suffer from an oversimplistic Faith in Things As They Are. This is no improvement over the tendency of feminist epistemologies at their worst to Belittle Things As They Are. Reading this book, I was struck by the paucity of essays joining in the respectful investigation of difficult matters. "What is compelling evidence?" is not a simple question. It is not foolish for people to try to question deeply how things are done, and simply stating that their answers come up short is not satisfactory, especially when the stock positions given as exemplary themselves fall short.

There are many articles in this book, and their quality is highly uneven. I will mention only four of them, which exemplify the worst and the best qualities.

Christina Hoff Sommers' "Where The Boys Are" is reprinted here from her book *The War Against Boys.* This article points out, quite reasonably, that boys have their own problems, but then concludes that therefore girls don't have any, or at least none that have to be addressed by society. This is where Laura Bush is coming from when she calls for schools to focus on the problems of boys.

Robert F. Almeder's "Equity and Academic Feminism" is just plain nasty. Having served for many years on my university's Women Studies Advisory Board, I could not recognize the caricature he presents of women's studies.

Meera Nanda's "Modern Science and the Oppressed" studies how the Dalit[6] movement in India used scientific methodology as a device for political liberation—anyone championing "indigenous science" as a necessarily liberating movement should read this article carefully. Nanda's article is an interesting example of a good way to refute a philosophical position: present evidence from the real world, and present it carefully.

Another interesting piece was Sharon L. Crasnow's "Can Science Be Objective? Feminism, Relativism, and Objectivity," which gave careful consideration to Helen Longino's work (which is fairly complex and quite interesting). Crasnow's article is an example of another approach I had hoped to find more of in this book—respectful consideration which, when it decides that it disagrees, decides so in a way that gives the reader enough knowledge and room to have her own opinion. Unfortunately, not enough of the other essays had that quality even in part.

There are reasons why so many of the essays seemed a bit shrill. And these days, due to the circumstance of living in Kansas where the state school board is once again attacking evolution, I am more sympathetic than I used to be. Put simply, science is under attack. It is under attack from the right because it is seen to question the Word of God. It is under attack from the left because it is seen to be part of the Machinery of Oppression. There is no denying that some of the work that goes on under the rubric of feminist epistemologies falls into the second camp, hence the sense reading this book that many of the authors have circled the wagons and loaded the guns. But while shouting simplistic positions loudly may be good political strategy, it is not the best way to defend ideas among those who care about ideas.

[6] a.k.a. Untouchable

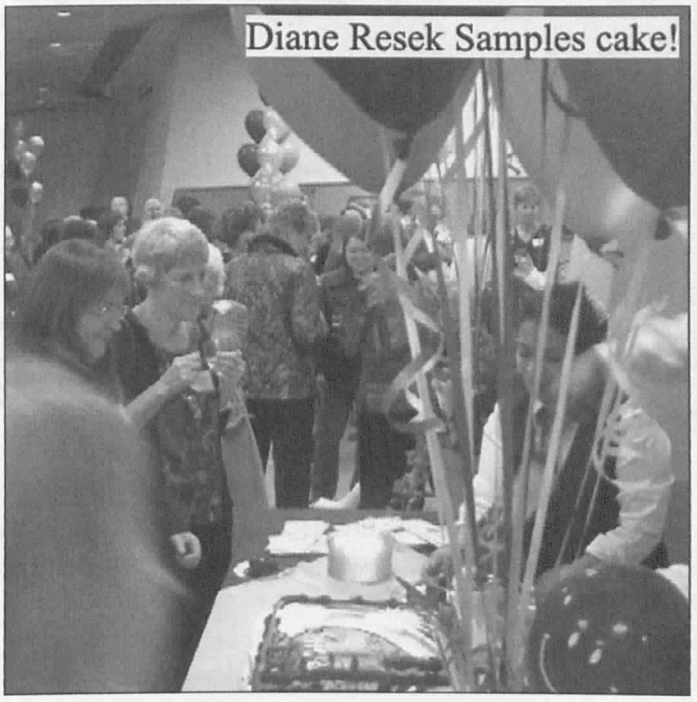
Math/Science Network Launches Ambassadors Program at 30th Anniversary Event

Teri Perl, president, Math/Science Network

On Sunday, November 14th, 2004, close to 200 people gathered to celebrate the 30th anniversary of the founding of the Math/Science Network, the non-profit organization whose mission is to increase the participation, retention, and advancement of girls and women in mathematics, science, engineering, and technology. Over the years more than a half million girls have been served by the Network's trademark annual Expanding Your Horizons conferences. (www.expandingyourhorizons.org) or Math/Science Network; 5000 MacArthur Boulevard, Oakland, CA 94613-1301; phone: 510-430-2222.

The past, the present, and the future had come together for this celebration at the Lawrence Hall of Science in Berkeley, California. The past was represented by many of the original founders of the Network, who were present. Network Board members as well as EYH conference coordinators, many who had traveled long distances to attend, represented the present. The future was represented by young women from the EYH 30/30 Ambassador program created in honor of this 30-year anniversary. Here past EYH conference alumnae who volunteer to become ambassadors for upcoming EYH conferences will, in the coming months, enjoy a series of after-school hands-on workshops typical of EYH conferences. Perhaps, most important, ambassadors will help design and distribute the EYH Tasting Kit™, a new

Ambassadors take a bow!



Diane Resek Samples cake!

EYH recruitment tool. The centerpiece of the tasting kit will be materials for at least one hands-on science experiment to be performed at home. Genentech is a major sponsor of the Ambassador program and these kits, and the corporate name and logo will be featured prominently on each kit.

Many people who had been actively involved in the formation of the organization and its mission were present. Lenore Blum had come west from Pittsburgh and Carnegie Mellon where she is currently a professor after many years as a faculty member at Mills College, site of the first EYH conference, and then later as Deputy Directory at MSRI (Mathematical Sciences Research Institute). Nancy Kreinberg, now retired from her long tenure as director of Equals, a milestone program started in the '70s and still based at the Lawrence Hall of Science, was there. So was Diane Resek who created "Math for Girls" at San Francisco State, an early program that focused on giving girls the tools to move ahead in mathematics. Jean Fetter Chu, Rita Levinson, Elizabeth Stage (now director of the Lawrence Hall of Science), Carol Langbort, Joanne Koltnow, Flora Russ, Sherry Fraser...the list of "old-timers" can go on and on. Even Lucy Sells, the one

time sociology graduate student whose research spotlighted the math deficiency among young women entering Berkeley that sparked the movement in the early '70s, was there as well.

Among the Expanding Your Horizons conference coordinators who were present was a group that had come from locations as distant as Tyler, TX; Silver City, NM; Seattle and Tacoma, WA; Pittsfield, MA; Orlando, FL and Raleigh, NC.* Their trips were funded by an NSF grant obtained by the Puget Sound Center for Teaching, Learning and Technology under the guidance of Karen Petersen, Washington EYH coordinator, and with the help of Stacey Roberts-Ohr, National Coordinator of the Network.

A Quicktime movie of the event created by Margo Nanny, educator, technologist and former Math/Science Network Board member, may be viewed at the Network website (www.eyhnet.org).

Note: Lenore Blum, who MC'd the formal part of the program, has written up the details; they are available at http://www.cs.cmu.edu/~lblum/MSN/30thAnniversaryCelebration.pdf.

Conversations Among Women in Mathematics

Organizers: Wiebke Diestelkamp, wiebke@udayton.edu and Aparna Higgins, aparna.higgins@notes.udayton.edu

On Saturday, November 6, 2004, seventy-seven students, teachers and practitioners of mathematics excitedly participated in *Conversations among Women in Mathematics,* held in the Department of Mathematics at the University of Dayton. *Conversations* consisted of a panel discussion on issues concerning women in mathematics, four parallel mathematics workshops and a luncheon, and was the morning component of our department's annual Math Events.

the panel

The panel discussion was very lively. The five women panelists, all of whom hold degrees in mathematics, were in various stages of their careers. Each panelist spoke for about ten minutes about her development as a mathematician, her career path and the challenges or opportunities presented to her along the way. While the panelists had very different careers, various similarities emerged from their stories—all of the panelists felt that it was important to take advanced mathematics classes, and all of them seemed to have a "go-getter" attitude. The panelists were:

- Marjorie August, senior software engineer, General Dynamics Land Systems
- Amy Bellis, cryptologic mathematician, National Security Agency
- Teresa Dean, senior human resources manager, Procter & Gamble
- Kathleen Dietz, senior mathematics and statistics teacher, Calvert Hall College High School
- Jane Pendergast, associate professor, Department of Biostatistics and Director, Center of Public Health Statistics, University of Iowa

Following the panel discussion, each participant attended a mathematics workshop. The goal of the workshops was to provide the participants with the opportunity to take part in "hands-on" activities in an area of mathematics that they had probably not been exposed to in their high school or college curriculum. The workshops and presenters were:

* The coordinators whose locations are mentioned above are: Vickie Geisel, Tyler, TX, EYH; Adrienne Dare, Silver City, NM, EYH; Karen Peterson, Seattle University; Sarah Gillooly, Girls Inc of the Berkshires, EYH, Pittsfield, MA; Julia Fallon, Tacoma, WA, EYH; Jennifer McDaniels, University of Central Florida, EYH; Joyce Hilliard-Clark, North Carolina State University, EYH.

attentive audience at the panel session

geometry workshop

- Code Breaking (Amy Bellis, National Security Agency)
- Crayons and Computers: Awesome Pictures of Mathematics (Annalisa Crannell, Franklin and Marshall College)
- Pondering Pebbling Problems (Aparna Higgins, University of Dayton)
- Geometry with Geometer's SketchPad (Becky Krakowski, University of Dayton)

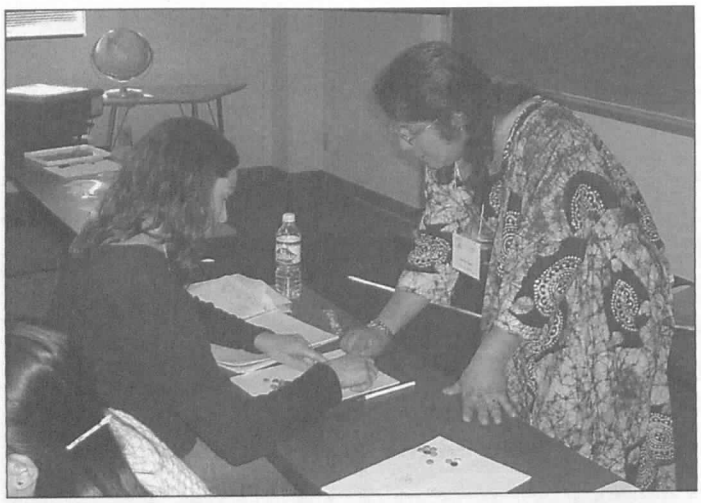
The feedback from the participants was very positive, as evidenced by these selections from the evaluations: "It was great! It made me more interested in math!"—"I really enjoyed the workshop. I loved being able to do some hands-on problem solving." (Pebbling); "I was really curious about the cryptology field, and Dr. Bellis really shed some light onto it. I really enjoyed doing the code breaking activity. I didn't realize there were so many ways to write in code!" (Code Breaking); "Very well done—focused on a different understanding of mathematics in our world from the creative artist perspective." (Crayons and Computers); "Just the right combo of time to work on our own and have the appropriate presenter support." (Geometer's SketchPad).

Following the workshops, we ended the program for *Conversations* with a sit-down luncheon. Seating was prearranged, so that each table had a mix of high school students, college and graduate students, teachers, and alums of our department. Several of the participants commented on how they liked the diversity at their table, as it gave them a chance to meet new people in mathematics. Sitting together in a group of students, professors, high school teachers and alums made for "intriguing conversations that were very informative on the subject of math at many different levels" (a quote from an evaluation form).

While *Conversations* ended with the luncheon, the department's Math Events continued through the afternoon with the 5th Annual Kenneth C. Schraut Lecture (delivered this year by Jane Pendergast on biostatistics) and the 21st Alumni Seminar, a career fair on opportunities in the mathematical sciences. A number of participants of *Conversations* took the opportunity and stayed for the entire day.

Of the seventy-seven participants who attended *Conversations,* fifty-nine were female. Most of the participants were students (high school or college), teachers and mathematics faculty. All our own undergraduate students had been encouraged to participate in *Conversations,* regardless of gender. A number of our alums (male and female) also attended *Conversations*—they had come back to campus for the Schraut Lecture and the Alumni Seminar and saw this as an invaluable opportunity to interact with students interested in mathematics.

We believe that the following logistical considerations contributed to making *Conversations* such a success:



pebbling workshop

- We had a web page with the registration form and information regarding the schedule, the panelists, the workshops and the luncheon. It also contained directions to campus, a campus map and information regarding parking.
- As part of the on-line registration, participants ranked the workshops according to their preference, and they also had the opportunity to choose an entree for the luncheon.
- Some of the workshops were geared mainly towards high school students, while the others were aimed mostly at college students. However, all workshops ended up with a mix of participants.
- Each participant received a folder with a name badge, the program, bios and contact information for all presenters, blank paper and a pen. In addition, the folder was chockfull of information, with brochures such as *Careers that Count* (the career brochure from the AWM), *Going Somewhere—Careers in Applied Mathematics* (from SIAM), various ASA brochures on careers in statistics and a brochure from the IMS. We also included a previous issue of *Math Horizons* (from the MAA). Every participant also received a commemorative pad of custom-made post-it notes.
- A long break between the panel discussion and the workshops helped facilitate informal networking and socializing.

More information about *Conversations among Women in Mathematics 2004*, as well as a description of the workshops and bios for all presenters, may be found at academic.udayton.edu/MathEvents/.

We gratefully acknowledge funding for *Conversations among Women 2004* from the following: The Association for Women in Mathematics Sonia Kovalevsky High School Mathematics Day Program (funded by Elizabeth City State University and the National Security Agency), the Tensor Foundation, the Leonard A. Mann, S.M., Chair in the Sciences at UD, the UD Women's Center and the Department of Mathematics at UD. We also thank the Society for Industrial and Applied Mathematics and the Mathematical Association of America and the Institute of Mathematical Statistics for their support.

SKHS Day at Saginaw State

Funded through grants from the National Security Agency and Elizabeth City State University. Thanks to our funding agencies!

Gretchen Mooningham, Saginaw Valley State University, agm@svsu.edu

One of the highlights of the day was a cooperative competition, the first activity after the opening. Girls from different schools were grouped into teams of four members. With 294 girls in attendance, we needed a large space. We used a banquet room with small tables and comfortable chairs. There was plenty of room.

the competition at Saginaw State

A number of businesses contributed small items to give away. Unfortunately, we did not have enough of any one of these items to give to each person. During the competition, two student assistants circulated throughout the room and gave each girl her choice of one of the items. In this way, the girls had the opportunity to talk with a college student who had an interest in mathematics.

The competition consisted of a set of 16 questions, which were puzzle-type problems suitable for group discussion. The teachers were invited to come by the room at some point to observe the competition. Several of the teachers expressed surprise at how serious the students were about the questions. Of course, the girls also had time to socialize and make new friends. As they worked, they nibbled on candy. Even though they were serious, the atmosphere was very relaxed. They were given approximately an hour and fifteen minutes to work on the questions. This was a bit too long since most groups were finished in an hour.

While the students ate lunch, there was time to mark the answer sheets. Prizes were given to the top teams. We were fortunate to have been given a generous supply of books from one of our textbook providers. Top prizes were given first. Each winner was allowed to select the book of her choice as her prize. For the top team, we also had $10 gift certificates from a popular store.

The group competition was fun for the girls and removed some of the anxiety associated with taking a test. They got to meet girls from different schools and different environments. For example, girls from urban schools worked with girls from rural schools. Possibly because they were removed from their friends, they tended to behave in a way that reflected positively on their school and on themselves.

Sonia Kovalevsky High School Mathematics Days

Through a grant (*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) to universities and colleges; more grants may be awarded if additional funds become available. 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 breakdown of 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 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. The 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 2005 and Spring 2006. 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 May 15, 2006, 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, 2006 for Spring 2006 *only if* funds remain after the August 2005 selection cycle.

Send *five* complete copies of the application materials to: Sonia Kovalevsky Days Selection Committee, Association for Women in Mathematics, 11240 Waples Mill Road, Suite 200, Fairfax, VA 22030. For further information: phone 703-934-0163, e-mail awm@awm-math.org, or visit www.awm-math.org. Applications must be received by **August 4, 2005**; applications via e-mail or fax will not be accepted.

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 San Antonio, TX, January 12–15, 2006 (Thursday–Sunday). The workshop is scheduled to be held on Sunday, January 15 with an introductory dinner/discussion group on Saturday evening, January 14.

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 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
11240 Waples Mill Road
Suite 200
Fairfax, VA 22030

Phone: 703-934-0163
E-mail: awm@awm-math.org URL: www.awm-math.org

APPLICATION DEADLINE

Applications must be received by **September 1, 2005**. Applications via e-mail or fax will not be accepted.

Honors and Awards

Fellows of American Academy of Arts & Sciences

press release, Paul Mueller, USCD

The academy will welcome this year's fellows and honorary members at its annual induction ceremony on October 8 in Cambridge, MA.

Linda Preiss Rothschild has been a professor of mathematics at UCSD since 1983. Her research areas include mathematical analysis and complex geometry. She is the co-editor-in-chief since 1994 of *Mathematical Research Letters.* She received her doctorate from MIT, was a co-winner of the Stefan Bergman Prize from the American Mathematical Society and was an Alfred P. Sloan Foundation fellow from 1976 to 1980.

M. Salah Baouendi has been a professor of mathematics at UCSD since 1988. He has been the editor of *Mathematical Research Letters* since 1994 and served as editor of the *American Journal of Mathematics* from 1988 to 1994. He has published widely in several areas of mathematics, including partial differential equations and complex analysis. He received his doctorate from the University of Paris and, in 2003, was a co-winner of the Stefan Bergman Prize from the American Mathematical Society.

Linda Preiss Rothschild

Dresselhaus Honored with Heinz Award

press release, MIT

Institute Professor Mildred Dresselhaus has won the 11th Heinz Award for Technology, the Economy and Employment in recognition of scholarship that has helped keep the US on the cutting edge of nanostructures and other technologies. Dresselhaus, an advocate for increased opportunities for women in the sciences for more than four decades, is among five distinguished Americans selected to receive the $250,000 awards, presented in five categories by the Heinz Family Foundation.

"Throughout her career, Dr. Mildred Dresselhaus has combined significant scientific accomplishments and prominent leadership roles with an abiding commitment to support the advancement of women in the sciences," said Teresa Heinz Kerry, chairman of the Heinz Family Foundation. "Amid public debate over the capacity of women to thrive in a scientific environment, Dr. Dresselhaus' esteemed career provides a decisive and resounding answer. Her quiet leadership, serving as a generous mentor and role model to countless women over the years, has had a profound impact on the scientific opportunities that are available to women today. We are pleased to recognize her life's work with the Heinz Award for Technology, the Economy and Employment."

Said Dresselhaus, "Among my greatest satisfactions—in addition to a marriage of 47 years and the raising of four wonderful children—has been empowering the young women who have been inspired to pursue a scientific calling. I hope that this award will provide additional inspiration, and I thank the Heinz Family Foundation for this tremendous honor."

A native of the Bronx, where she showed an early aptitude for the violin, Dresselhaus shifted focus in college from music to physics. Following her doctoral work at the University of Chicago, she focused her initial research on solid-state physics and superconductivity. In 1960, she and her husband, physicist Gene Dresselhaus, moved to MIT, where they remain.

Dresselhaus is one of the nation's foremost experts in the multifaceted field of carbon science. Her investigations into superconductivity, the electronic properties of carbon,

thermoelectricity and the new physics at the nanometer scale have helped yield numerous scientific discoveries. She has lectured around the world, written extensively about her research and served in prominent leadership roles, including as director of the office of science at the US Department of Energy during the Clinton administration; as president of the American Physical Society; and as president of the American Association for the Advancement of Science. Among her numerous honors is the National Medal of Science, which she received from President Bush in 1990. She has 16 honorary degrees from various colleges and universities.

The mother of four faced unique challenges in the workplace, which perhaps provided the inspiration to assist other women pursue scientific careers. In 1970 she co-founded the Women's Forum at MIT—established to equalize opportunities for all women at MIT—and received a Carnegie Foundation grant to encourage women's study of traditionally male-dominated fields, such as physics. She also became the Abby Rockefeller Mauze chair, endowed in support of the scholarship of women in science and engineering. When Dresselhaus arrived at MIT in 1960, women comprised just 4 percent of the student population; the percentage of women today is 40 percent.

2005 Abel Prize

press release

The Norwegian Academy of Science and Letters has decided to award the Abel Prize for 2005 to Peter D. Lax, Courant Institute of Mathematical Sciences, New York University, for his groundbreaking contributions to the theory and application of partial differential equations and to the computation of their solutions. Ever since Newton, differential equations have been the basis for the scientific understanding of nature. Linear differential equations, in which cause and effect are directly proportional, are reasonably well understood. The equations that arise in such fields as aerodynamics, meteorology and elasticity are nonlinear and much more complex: their solutions can develop singularities. Think of the shock waves that appear when an airplane breaks the sound barrier.

In the 1950s and 1960s, Lax laid the foundations for the modern theory of nonlinear equations of this type (hyperbolic systems). He constructed explicit solutions, identified classes of especially well-behaved systems, introduced an important notion of entropy, and, with Glimm, made a penetrating study of how solutions behave over a long period of time. In addition, he introduced the widely used Lax-Friedrichs and Lax-Wendroff numerical schemes for computing solutions. His work in this area was important for the further theoretical developments. It has also been extraordinarily fruitful for practical applications, from weather prediction to airplane design.

Another important cornerstone of modern numerical analysis is the "Lax Equivalence Theorem." Inspired by Richtmyer, Lax established the conditions under which a numerical implementation gives a valid approximation to the solution of a differential equation. This result brought enormous clarity to the subject.

A system of differential equations is called integrable if its solutions are completely characterized by some crucial quantities that do not change in time. A classical example is the spinning top or gyroscope, where these conserved quantities are energy and angular momentum. Integrable systems have been studied since the 19th century and are important in pure as well as applied mathematics. In the late 1960s a revolution occurred when Kruskal and co-workers discovered a new family of examples, which have soliton solutions: single-crested waves that maintain their shape as they travel. Lax became fascinated by these mysterious solutions and found a unifying concept for understanding them, rewriting the equations in terms of what are now called "Lax pairs." This essential tool led to new constructions of integrable systems and facilitated their study.

Scattering theory is concerned with the change in a wave as it goes around an obstacle. This phenomenon occurs not only for fluids, but also, for instance, in atomic physics (Schrödinger equation). Together with Phillips, Lax developed a broad theory of scattering and described the long-term behavior of solutions (specifically, the decay of energy). Their work also turned out to be important in fields of mathematics apparently very distant from differential equations, such as number theory. This is an unusual and very beautiful example of a framework built for applied mathematics leading to new insights within pure mathematics.

AWM

Lax has been described as the most versatile mathematician of his generation. His use of geometric optics to study the propagation of singularities inaugurated the theory of Fourier Integral Operators. With Nirenberg, he derived the definitive Gårding-type estimates for systems of equations. Other celebrated results include the Lax-Milgram lemma and Lax's version of the Phragmén-Lindelöf principle for elliptic equations.

Lax stands out in joining together pure and applied mathematics, combining a deep understanding of analysis with an extraordinary capacity to find unifying concepts. He has had a profound influence, not only by his research, but also by his writing, his lifelong commitment to education and his generosity to younger mathematicians.

See www.abelprisen.no/en for further information.

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2004/2005 Membership Form

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Volume 35, Number 4, July–August 2005

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