AWM
ASSOCIATION FOR WOMEN IN MATHEMATICS

# Newsletter

VOLUME 45, NO. 3 • MAY–JUNE 2015

**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.

## IN THIS ISSUE



## PRESIDENT'S REPORT

I remember very clearly the day I met Cora Sadosky at an AWM event shortly after I got my PhD, and, knowing very little about me, she said unabashedly that she didn't see any reason that I should not be a professor at Harvard someday. I remember being shocked by this idea, and pleased that anyone would express such confidence in my potential, and impressed at the audacity of her ideas and confidence of her convictions.

Now I know how she felt: when I see the incredibly talented and passionate young female researchers in my field of mathematics, I think to myself that there is no reason on this earth that some of them should not be professors at Harvard. But we are not there yet … and there still remain many barriers to the advancement and equal treatment of women in our profession and much work to be done.

**Prizes and Lectures.** AWM can be very proud that today we have one of our Research Prizes named for Cora and her vision is being realized. The AWM Research Prizes and Lectures serve to highlight and celebrate significant contributions by women to mathematics. The 2015 **Sonia Kovalevsky Lecturer** will be **Linda J. S. Allen**, the Paul Whitfield Horn Professor at Texas Tech University. AWM established this lecture jointly with SIAM in 2003. This year the lecture will be given at the International Congress on Industrial and Applied Mathematics (ICIAM), in Beijing, China, August 10–14, 2015, and SIAM President Pamela Cook will introduce the lecture.

The 2015 **Michler Prize** winner is **Malabika Pramanik**, Associate Professor at the University of British Columbia. The Ruth I. Michler Memorial Prize of the AWM is awarded annually to a woman recently promoted to associate professor, providing a fellowship for the awardee to spend a semester in the Mathematics Department of Cornell University without teaching obligations.

Congratulations to this year's awardees! Please see the press releases on pages 4–6 of this issue of the newsletter.

**AWM Scientific Advisory Committee.** In order to help ensure that outstanding work by women in mathematics is also recognized through prizes, Fellow nominations, and named lectures by other societies, the AWM Executive Committee voted in January to approve a proposal from the Awards Committee to establish an AWM Scientific Advisory Committee. This committee will consist of six members serving staggered three-year terms and will be charged with generating names of potential nominees and procuring nominations for women to be recipients of distinguished prizes, awards and honors of organizations related to the mathematical sciences, including SIAM, AMS, MAA, and AWM. The committee will monitor and generate suggestions for nominations, develop efficient processes

*continued on page 2*

ASSOCIATION FOR WOMEN IN MATHEMATICS

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.

Opinions expressed in AWM *Newsletter* articles are those of the authors and do not necessarily reflect opinions of the editors or policies of the Association for Women in Mathematics. Authors sign consent to publish forms.

Circulation: 3500. 



## PRESIDENT'S REPORT *continued from page 1*

for ensuring that nominations are submitted and, over time, establish social networking mechanisms to generate names and nominations. I look forward to launching this committee as soon as possible and to working with them over the next two years to increase the number of women recognized for their mathematical excellence.

**Corporate Sponsors.** Last year, AWM launched a new Corporate Membership and Sponsorship category, to encourage support for our mission from industry and government and to form stronger connections with these organizations to improve and expand jobs opportunities for women in the mathematical sciences. I am pleased to say that our initial efforts to engage with Corporate Sponsors have been extremely successful, with new Corporate Sponsorships of AWM from **INTECH** and **Elsevier**, and new AWM Symposium sponsors including **Springer**, **Google**, and **Wolfram**, in addition to ongoing sponsorship of the Symposium from **Microsoft Research** and the **University of Maryland**. The AWM Research Symposium turned out to be a good opportunity to attract sponsorship due to the high-quality program of Special Sessions, the high-profile Plenary Speakers and the large number of attendees. Sponsors at the Silver level and above were offered booth space. Government agencies supporting the Symposium through grants or purchasing booth space were given the opportunity to have a representative on the jobs panel at the Networking Event along with corporate sponsors, to talk about rewarding career paths in mathematics in industry and government. Wolfram provided financial support and in-kind product donations, offering free copies of Mathematica to the winners of the **Wolfram Poster Contest**.

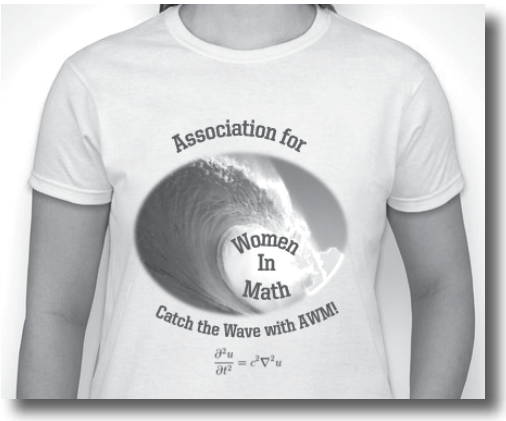
We are actively seeking expanded sponsorship for targeted initiatives such as pipeline K–12 outreach programs and other efforts to support women's careers in mathematics in both research and as mathematics educators. As AWM members, please be on the lookout for potential new sponsors and engage to explore potential mutually beneficial relationships.


**AWM-Springer Series.** The first volume of the new Association for Women in Mathematics Series by Springer is in production! The first volume, edited by **Kathryn Leonard** and **Sibel Tari**, contains the Proceedings of the **WiSh** conference, Women in Shape Analysis, the Research Collaboration Conference for Women held at IPAM in summer 2013 and followed up by the AWM JMM Workshop in 2014. The cover design is based on an idea from **Lillian Pierce**, representing an Apollonian circle packing, and it will be a common cover design for the whole series. The next two volumes in the series will appear later this year, based on the **WINE** (Women In Numbers—Europe, Luminy 2013) and **WIN3** (Women In Numbers—Banff 2014) Research Collaboration Conferences. WINE is edited by **Marie-José Bertin**, **Alina Bucur**, **Brooke Feigon**, and **Leila Schneps**. WIN3 is edited by **Ellen Eischen**, **Ling Long**, **Rachel Pries**, and **Katherine Stange**. The Association for Women in Mathematics Series publishes volumes which are refereed at the same standard as the volumes in the AMS Contemporary Mathematics Series and serve to showcase the research done by emerging networks of female collaborators at these conferences.

**Media Committee.** AWM launched a Facebook page several years ago while Jill Pipher was President. With the world of social media rushing by us, there was awareness at the January EC meeting that with our new Web Editor, AWM could do more to coordinate its web and media presence. This led to the formation of an ad hoc Media Committee. The short-term goals of the committee are to improve communication with our members, to reach and attract new members, to raise the profile and awareness of AWM in the math community and in the public, to attract media attention for our events, and to attract more corporate sponsors for the organization and for our initiatives. The Media Committee will be chaired by Web Editor **Adriana Salerno**, with committee members **Talitha Williams**, who handles our Facebook content and posting, our Twitter Czar-ess **Anna Haensch**, *Newsletter* editors **Anne Leggett** and **Sarah Greenwald**, Wikipedia Guru **Marie Vitulli**, Executive Director **Magnhild Lien** and myself.

One of the first actions of the new committee was to launch the **AWM Twitter** feed, **@AWMmath**, thanks to Anna (as she tagged it, #fashionablylate). The AWM Symposium will be live-blogged and tweeted by Adriana and Anna, and we hope to have coverage from mainstream media outlets. One of our short-term goals is to coordinate better with AWM Student Chapters on Facebook and Twitter. Ideas are welcome! If you use social media, please follow AWM on Twitter and Facebook and send us content. Email ideas to us or post them on our Facebook page or tweet them to us!

The committee also helped refine the AWM Symposium poster and the new AWM t-shirt design, both designed on a volunteer basis by my 14-year-old daughters, **Joyce** and **Josephine Passananti**. The t-shirts will be sold at the Symposium and, if popular, the media committee will launch a new tradition of design contests for future AWM t-shirts, with fabulous prizes provided by our sponsors!




**In Memory.** AWM is saddened to acknowledge the passing of a number of members of the AWM community. Richard Schafer was a retired Professor of Mathematics at MIT and husband of the late Alice T. Schafer (second president of AWM). Eleanor Palais was an early member of a group of female mathematicians organized by Linda Rothschild and Alice Schafer, a group which pre-dated AWM and which later came to be called the "Boston area mafia of AWM." Ellie was a longtime chair of the AWM Fundraising Committee. Tim Cochran was a Professor of Mathematics at Rice University and husband of Shelly Harvey, AWM Symposium Organizer, and the family has asked for donations to AWM in lieu of flowers. Lee Lorch was a longtime supporter of AWM and will be celebrated at the banquet of the AWM Symposium in April. Please see the In Memoriam section of this and future newsletters for tributes.

**Final Thoughts.** I was inspired by President Obama's recent speech commemorating the 50th anniversary of the March for Voting Rights in Selma, Alabama. He exhorted us to "imagine the future" and, while recognizing how much

*continued on page 4*

**Membership Dues**
*Membership runs from Oct. 1 to Sept. 30*
**Individual:** $65 **Family:** $30
**Contributing:** $150
**New member, affiliate and reciprocal members, retired, part-time:** $30
**Student, unemployed:** $20
**Outreach:** $10
*AWM is a 501(c)(3) organization.*

**Institutional Membership Levels**

**Category 1:** $325
**Category 2:** $325
**Category 3:** $200

See www.awm-math.org for details on free ads, free student memberships, and ad discounts.

**Sponsorship Levels**

α **Circle:** $5000+
β **Circle:** $2500–$4999
γ **Circle:** $1000–$2499

**Corporate Sponsorship**
See the AWM website for details.

**Print Subscriptions and Back Orders**—Regular and contributing members living in the US may elect to receive a print version of the *Newsletter.* Libraries, women's studies centers, non-mathematics departments, etc., may purchase a subscription for $65/year. Back orders are $10/issue plus shipping/handling ($5 minimum).

**Payment**—Payment is by check (drawn on a bank with a US branch), US money order, or international postal order. Visa and MasterCard are also accepted.

**Newsletter Ads**—AWM will accept ads 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 Managing Director, 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 $116 for a basic four-line ad. Additional lines are $14 each. See the AWM website for *Newsletter* display ad rates.

**Newsletter Deadlines**
**Editorial:** 24th of January, March, May, July, September, November
**Ads:** Feb. 1 for March–April, April 1 for May–June, June 1 for July–Aug., Aug. 1 for Sept.–Oct., Oct. 1 for Nov.–Dec., Dec. 1 for Jan.–Feb.

**Addresses**
Send all queries and all *Newsletter* material except ads and queries/material for columns to Anne Leggett, leggett@member.ams.org. Send all book review queries/material to Marge Bayer, bayer@math.ku.edu. Send all education column queries/material to Jackie Dewar, jdewar@lmu.edu. Send all media column queries/material to Sarah Greenwald, greenwaldsj@appstate.edu and Alice Silverberg, asilverb@math.uci.edu. Send everything else, including ads and address changes, to AWM, fax: 703-359-7562, e-mail: awm@awm-math.org.

progress has been made, he emphasized that there is still work to be done, and that we should "run, so that the next generation may soar!" I don't believe that he was thinking only of race relations in his speech, and when I think of the power of mathematics to transform both individual lives and our society, I become more convinced than ever of the importance and the relevance of AWM's mission today. By promoting careers for women and girls in the mathematical sciences, we help ensure future progress for our society, and I for one imagine a future where half of the mathematics faculty is female at all of our top universities, including Harvard! And I believe that we are going to get there, through our collective efforts!

*Kristin Lauter*

Kristin Lauter
La Jolla, CA
March 24, 2015

# Linda J. S. Allen to Be AWM-SIAM Sonia Kovalevsky Lecturer

The Association for Women in Mathematics and the Society for Industrial and Applied Mathematics (SIAM) have selected Linda J. S. Allen to deliver the prestigious Sonia Kovalevsky Lecture at the 8th International Congress on Industrial and Applied Mathematic (ICIAM) in Beijing, China, August 10–14, 2015.

Allen is the Paul Whitfield Horn Professor of Mathematics in the Department of Mathematics and Statistics at Texas Tech University. She was selected as the AWM-SIAM Sonia Kovalevsky Lecturer for her outstanding contributions in ordinary differential equations, difference equations, and stochastic models, which have significant applications in the areas of infectious diseases and ecology.

*Linda J.S. Allen*

Allen received her PhD from the University of Tennessee in 1981 under the supervision of T. G. Hallam. In 1985 she came to Texas Tech University and quickly moved through the ranks. In 2010, Texas Tech recognized her extensive scientific contributions and her groundbreaking work on deterministic and stochastic models with a Paul Whitfield Horn Professorship.

ASSOCIATION FOR WOMEN IN MATHEMATICS

## AWM ONLINE

The *AWM Newsletter* is freely available online.

**Online Ads Info:** Classified and job link ads may be placed at the AWM website.

**Website:** http://www.awm-math.org

**Web Editor**

Adriana Salerno, asalerno@bates.edu

## AWM DEADLINES

AWM Travel Grants:
May 1, 2015 and October 1, 2015

AWM Workshop at JMM:
August 15, 2015

AWM-MAA Falconer
Lecturer: September 1, 2015

AWM Alice T. Schafer Prize:
September 15, 2015

AWM-AMS Noether Lecture:
October 15, 2015

AWM-SIAM Sonia Kovalevsky Lecture:
November 1, 2015

AWM Workshop at SIAM 2016:
November 1, 2015

Ruth I. Michler Memorial Prize:
November 1, 2015

## AWM OFFICE

Magnhild Lien, Executive Director
mlien@awm-math.org

Jennifer Lewis, Managing Director
jennifer@awm-math.org

Matthew Hundley, Membership Director
matthew@awm-math.org

11240 Waples Mill Road, Suite 200
Fairfax, VA 22030
phone: 703-934-0163
fax: 703-359-7562
awm@awm-math.org

Since 1999, Allen has served as an adjunct professor at the Institute of Environmental and Human Health at Texas Tech. She has spent two spring terms at the Mathematical Bioscience Institute (MBI) at The Ohio State University.

Allen is an extremely productive researcher. Her work has impacted the field of mathematical epidemiology and ecological modeling, as is evidenced by the numerous citations of her work and the external support she has received from the National Science Foundation, the National Institutes of Health, and the Texas Higher Education Coordinating Board over the past 20 years. Allen is also a leader in promoting and cultivating scientific collaborations with colleagues from other areas. She has brought about significant changes in the way mathematicians interact with other scientists and has successfully bridged the traditional interdisciplinary divide between mathematics and the biological sciences.

Currently, Allen serves on the editorial board of four prestigious journals and serves as a reviewer for numerous others. She is the author of ninety research articles, two books and a book chapter and is a sought-after speaker both in the US and abroad. The title of her Sonia Kovalevsky Lecture is "Predicting Population Extinction, Disease Outbreaks and Species Invasions Using Branching Processes."

*The 8th International Congress on Industrial and Applied Mathematics will be held August 10–14 in Beijing, China. The Kovalevsky Lecture honors Sonia Kovalevsky (1850–1891), the most widely known Russian mathematician of the late 19th century. In 1874, Kovalevsky received her Doctor of Philosophy degree from the University of Gottingen and was appointed lecturer at the University of Stockholm in 1883. She did her most important work in the theory of differential equations. Past Kovalevsky lecturers are Irene M. Gamba, Margaret Cheney, Barbara Keyfitz, Susanne Brenner, Suzanne Lenhart, Andrea Bertozzi, Dianne P. O'Leary, Lai-Sang Young, Irene Fonseca, Ingrid Daubechies, Joyce McLaughlin, and Linda R. Petzold.*

# Malabika Pramanik Wins Ruth I. Michler Memorial Prize

The Association for Women in Mathematics and Cornell University are pleased to announce that Malabika Pramanik, University of British Columbia will receive the 2015–2016 Ruth I. Michler Memorial Prize.

The Michler Prize grants a mid-career woman in academia a residential fellowship in the Cornell University mathematics department without teaching obligations. This pioneering venture was established through a very generous donation from the Michler family and the efforts of many people at AWM and Cornell.

Malabika Pramanik was selected to receive the Michler Prize because of her wide range of mathematical talent and the close connection of her work with the research of the analysis group at Cornell. She earned a B Stat in Statistics from Indian Statistical Institute, Calcutta in 1993 and an M Stat from the same institution in 1995. Malabika received her PhD in mathematics under the direction of F. Michael Christ from the University of California, Berkeley in 2001.

Before coming to the University of British Columbia in 2006, where she is currently an associate professor in the Department of Mathematics, Pramanik spent time as a Fairchild Senior Research Fellow at California Institute of Technology, Visiting Assistant Professor at University of Rochester, and Van Vleck Assistant Professor at the University of Wisconsin–Madison. She is currently an adjunct visiting faculty member (2014–2017) at the Centre for Applicable Mathematics, Tata Institute of Fundamental Research, Bangalore, India. In 2005 she was a US Junior Oberwolfach Fellow (awarded by NSF). She will be spending the spring 2016 semester at Cornell University.

Malabika Pramanik

Pramanik's research spans several areas including Euclidean harmonic analysis, geometric measure theory, several complex variables, partial differential equations, and inverse problems. Her work is partially funded by research grants from the National Science and Engineering Research Council of Canada (NSERC) and the National Science Foundation (NSF).

*continued on page 6*

### RUTH I. MICHELER MEMORIAL PRIZE

*continued from page 5*

About her upcoming semester at Cornell Pramanik says: "I look forward to this unique opportunity of interacting with Professors Camil Muscalu and Robert Strichartz. Their research in harmonic analysis, specifically the theory of multilinear singular integrals and convergence of Fourier series (Muscalu) and spectral analysis of fractal sets (Strichartz) are of great interest to me. In general, I hope to benefit from the inspiring environment of Cornell's mathematics department, with its many distinguished faculty and myriad academic events."

*Ruth Michler's parents Gerhard and Waltraud Michler of Essen, Germany established the memorial prize with the Association for Women in Mathematics because Ruth was deeply committed to its mission of supporting women mathematicians. Cornell University was chosen as the host institution because of its distinctive research atmosphere and because Ithaca was Ruth's birthplace. At the time of her death, Ruth was in Boston as an NSF visiting scholar at Northeastern University. A recently promoted associate professor of mathematics at the University of North Texas, she was killed on November 1, 2000 at the age of 33 in a tragic accident, cutting short the career of an excellent mathematician.*

# AWM Essay Contest

Congratulations to all the winners of the 2015 AWM Essay Contest: Biographies of Contemporary Women in Mathematics! Many thanks to Heather Lewis, Nazareth College, contest organizer, for coordinating the judging, and to the committee that does the matching (of students to subjects) and the judging. We are also grateful to Math for America for their sponsorship of this contest. The essay contest is intended to increase awareness of women's ongoing contributions to the mathematical sciences by inviting students from sixth-graders through college seniors to write biographies of contemporary women mathematicians and statisticians in academic, industrial, and government careers.

The 2015 Grand Prize essay appears after the list of this year's winners. Congratulations to all! To see the other prize-winning essays, visit http://www.awm-math.org/biographies/contest/2015.html.

### GRAND PRIZE WINNER

"Oasis in the Desert"
Makayla Gates, Valencia Middle School,
Peralta, New Mexico
(The essay was about Mrs. Gretta Aguilar of Valencia Middle School.)

### Undergraduate Level Winner

"Painting with the President: Maria Klawe—Mathematician, Artist, and Educator"
Ramita Kondepudi, Harvey Mudd College,
Claremont, California
(The essay was about Dr. Maria Klawe of Harvey Mudd College.)

### Undergraduate Level Honorable Mention

"How to Math?!"
Ellen Li, University of California, Berkeley,
Berkeley, California
(The essay was about Dr. Laura Taalman of James Madison University.)

### High School Level Winner

"If the Parameters Change"
Kina Sekito, Troy High School, Troy, Ohio
(The essay was about Dr. Irina Kogan of North Carolina State University.)

### High School Level Honorable Mention

"Dr. Mary Emond: Solving Real World Brain Teasers"
Allison Kirkegaard, Downers Grove North High School,
Downers Grove, Illinois
(The essay was about Dr. Mary Emond of the University of Washington.)

### Middle School Level Winner

Same as Grand Prize Winner.

### Middle School Level Honorable Mentions

"Good Vibrations"
Courtney Amsden, Desert Ridge Middle School,
Albuquerque, New Mexico
(The essay was about Dr. Laura Jacobs of Sandia National Labs.)

"The Beautiful Concept of Math"
Caroline Crawford, homeschool, Orange Park, Florida
(The essay was about Dr. Dorothy Buck of the Imperial College in London.)

## Oasis in the Desert

*Makayla Gates*

The bright eye of the morning sun turns the Manzano Mountains a muted blend of watermelon pinks and indigo blues as it rises above the rocky precipice. It is mid-November, almost the middle of another school year, yet Gretta still waits breathlessly for "el sol" to free itself of the eastern horizon and ignite the blinding flare of snowcaps, signaling a new day. Gretta Baca Aguilar, a middle school algebra teacher, grew up here in the high desert of New Mexico with three sisters and a brother, in a family of educators. Her grandfather and both parents were teachers but she is the only one of her generation to pursue teaching as a career. Her parents encouraged Gretta to pursue math, her subject of choice, yet at the same time warned her that financial gain would not be found in her career choice. Gretta, however, thinking back to her childhood, always knew she would be a teacher, especially a math teacher like her father.

Valencia Middle School, where Mrs. Aguilar teaches, sits alone amidst a sandy windswept vastness dotted with scrub brush and the occasional jackrabbit. Driving to work through the flatlands each morning gives Aguilar time to contemplate her day, her family, her life-choices. As she drives, she sips her coffee and plans classroom activities for the day keeping her ultimate goal in mind. "I chose to teach math because I want to teach students how to think and not be afraid of math. I was always afraid of my high school teachers. I'm sure they don't understand the impact they had on me but they were so mean. I want to show students that everyone can do math!" This is what fuels her enthusiasm to teach in one of the most poverty-stricken areas in the US, with the state ranking 49th of 50. "I love teaching math because I feel I can make a 'hard' subject become a subject kids feel more comfortable and confident with, and want to pursue high level math classes."

Aguilar is well aware that reaching her goal is not an easy task, especially here in New Mexico where linguistically and culturally different students are the norm, and hunger, housing insecurity, unstable home lives, lack of parental involvement and reduced access to health care contribute to the dire poverty and educational deficiencies experienced by a majority of her students. In 2013, only 23% of NM 8th graders tested proficient or above in math. Aguilar wants to help change that. Communication is key to her success as a teacher and Aguilar just recently received her endorsement in TESOL, Teaching English to Speakers of Other Languages, using her own mother, a bilingual teacher raising five children while acquiring her PhD, as a role model. With a bachelor's degree in teaching from the University of New Mexico and a master's degree from Washington State, she is licensed to teach social studies and language arts in addition to her personal passion, mathematics. "My favorite part of teaching math is the students. Students

*continued on page 8*

CALL FOR NOMINATIONS

## The 2016 Etta Z. Falconer Lecture

The Association for Women in Mathematics and the Mathematical Association of America (MAA) annually present the Etta Z. Falconer Lecture to honor women who have made distinguished contributions to the mathematical sciences or mathematics education. These one-hour expository lectures are presented at the MAA MathFest each summer. While the lectures began with MathFest 1996, the title "Etta Z. Falconer Lecture" was established in 2004 in memory of Falconer's profound vision and accomplishments in enhancing the movement of minorities and women into scientific careers.

The mathematicians who have given the Falconer lectures in the past are: Karen E. Smith, Suzanne M. Lenhart, Margaret H. Wright, Chuu-Lian Terng, Audrey Terras, Pat Shure, Annie Selden, Katharine P. Layton, Bozenna Pasik-Duncan, Fern Hunt, Trachette Jackson, Katherine St. John, Rebecca Goldin, Kate Okikiolu, Ami Radunskaya, Dawn Lott, Karen King, Pat Kenschaft and Marie Vitulli.

The letter of nomination should include an outline of the nominee's distinguished contributions to the mathematical sciences or mathematics education and address the nominee's capability of delivering an expository lecture. Nominations are to be submitted as ONE PDF file via MathPrograms.Org. The submission link will be available 45 days prior to the deadline. Nominations must be submitted by **September 1, 2015** and will be held active for two years. If you have questions, phone 703-934-0163 or email awm@awm-math.org.

are still so innocent. They haven't been corrupted by life yet. They have a hunger for learning and will work hard for you if they respect you. Math is a hard subject for most students but I hope by the end of the year I have at least 'opened' the door for the majority of them in terms of their conceptual understanding of math and confidence."

Confidence is the thing Aguilar identifies as the hardest obstacle she ever encountered in trying to become a math teacher. In reflection, she wishes she would have spoken up for herself more, asked more questions and not felt "bad" for bothering a teacher when she needed help, and wouldn't have been so afraid of failure. "I do think the stereotype of girls always being nice and respectful and never questioning authority hurt me most. When I didn't understand a math problem I was too afraid to ask for help when I felt I needed it…. Society as a whole creates stereotypes and unfortunately it hurts. Women have worked long and hard to get where we are and in some countries I would hate to be born a woman. We have come far, but we still have lots of work to do…. I do realize there's a small percentage of women in mathematical careers, but looking back, I think my own perceptions were my worst enemy."

Aguilar would like to see girls entering math classes with more confidence and not being so hard on themselves. "They need to learn how to be best friends with themselves. The voice inside of our head needs to be words of encouragement, not self-doubt." In that same vein, her advice to students pursuing a mathematical career is to have a "growth mindset" and believe in yourself. "Speak up for yourself and know that you matter! No one was born perfect. If you really want something it takes hard work and determination. Finally, accept failure and learn from it." Aguilar wants to see more after-school programs that focus on math and science. In the rural area where she teaches, transportation is a major obstacle, but she feels project-based learning would encourage more women to pursue a career in math.

At present, Aguilar is focused upon yet another problem facing one of her students, as she finally pulls into the dusty lane leading to the parking area of the school. Her wish for a student advocate who understands the bureaucracy of schools has given her yet another unpaid but worthy job to do. But would she change this life? "If I could change one thing in this world I would change myself. I would try to be more loving and patient. I believe I can't change the world unless I change myself first." For those who thirst for an education, Mrs. Aguilar is truly an oasis in the desert.

**About the Student:**

My name is Makayla Gates. I am a 7th grader at Valencia Middle School in Tome, New Mexico. I have always loved math and science and hope someday to become a theoretical physicist or mathematician. I used some of my math and science knowledge to create an acoustic levitator to clean solar panels for my 6th grade science project. This earned me a win at my school science fair, Regionals with multiple special awards, a special award at State and two nominations to the Broadcom MASTERS National Competition where I became a finalist in Washington, DC and met President Obama.

## MEDIA COLUMN

*In addition to longer reviews for the media column, we invite you to watch for and submit short snippets of instances of women in mathematics in the media (WIMM Watch). Please submit to the Media Column Editors: Sarah J. Greenwald, Appalachian State University,* greenwaldsj@appstate.edu *and Alice Silverberg, University of California, Irvine,* asilverb@math.uci.edu.

# Katherine G. Johnson MAKERS Profile Videos

*Ron Eglash, Rensselaer Polytechnic Institute*

When we think of the pioneering voices of African American women we might conjure images of writers like Maya Angelou, or politicians like Shirley Chisholm. But NASA mathematician Katherine Johnson, featured on makers.com's recent video series, gives us a glimpse of a nearly invisible but equally profound community of pioneers for whom "escape velocity" was both literal and metaphoric. Modest and plain spoken, Johnson's description of her life nicely balances the accounts of her technical achievements with some of the challenges of racism and sexism she encountered. The challenges are recounted with a light touch; we get the sense that it is more with amusement at how wrong that bigotry was proved to be than any sense of bitterness ("they hired a few women as mathematicians but the idea was that we would do some little things while they did the real thinking" she says with a broad smile). Her genius showed from an early age; she entered West Virginia State College at fifteen. By coincidence one of the only three African American math PhDs in the

*Katherine G. Johnson*

nation at the time, W. W. Schieffelin Claytor, happened to be teaching there and encouraged her to become a research mathematician—a career which, with typical humor, she notes she knew nothing about.

The only down side to the videos is that they restrict visualizations of the mathematics to aesthetically pleasing but information-poor montages of equations and flight paths moving across the screen, the result of which only reinforces the myth that math is some mysterious process only true geniuses can embrace. Nonetheless, Johnson is clearly well practiced at describing her tasks by painting a picture in words; perhaps the best "mathematical moment" is in the segment titled "computations to the moon" in which she describes how they reduced the three dimensions of space to a plane in order to calculate the intersecting orbits of moon, earth and spacecraft. In other moments the math itself is more muted, but its role in the crucial life-and-death process of space flight are made all the more apparent. One of the best examples is a sort of reverse "John Henry" story: rather than getting surpassed in endurance by the steam engine, here astronaut John Glenn insists that Johnson's work will be the measure of the quality of calculations by an early electronic computer (1962).

Whether biting her nails as she watches her equations bring the first humans back from the moon, or recounting the role of her mother's encouragement, this series of video interviews with Katherine Johnson both humanizes and elevates the work of mathematicians; it is well worth the watch (http://www.makers.com/katherine-g-johnson).

*continued on page 10*

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 September 15, 2015. She must either be a US citizen or have a school address in the US. The Prize will be awarded at the Joint Prize Session at the Joint Mathematics Meetings in Seattle, WA January 2016.

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 the 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, recommendation letters from professors, colleagues, etc.) should be enclosed with the nomination. All nomination material is to be submitted as ONE PDF file via MathPrograms.Org with a copy of transcripts included at the end of the file. The submission link will be available 45 days prior to the deadline. Nominations must be received by **September 15, 2015**. If you have questions, phone 703-934-0163, email awm@awm-math.org, or visit www.awm-math.org.

## WIMM Watch: *Resurrection* and the Elegant Statistician

*Sarah J. Greenwald and Jill E. Thomley, Appalachian State University*

There's something strange in the neighborhood. It's a mystery involving people from Arcadia, Missouri who have returned from the dead. Who is Martin Bellamy gonna call for answers? No, it's not ghostbusters on the line, but instead a mysterious woman previously credited as "the elegant woman" at the beginning of Season 2 on ABC's *Resurrection* (http://abc.go.com/shows/resurrection/). It is not until episode six, "Afflictions," which originally aired on November 2, 2014, that we find out she is a statistician at a top-secret government facility. And the name on the door of her office? Angela Forrester. For Forrester, "everything in nature follows a pattern and is therefore subject to prediction … definitions change but numbers are perfect. Numbers don't lie." Forrester is researching the resurrected and her exceptionally spacious and well-appointed office contains many mathematical objects, such as statistical distributions, integrals, series, algebraic terms, a unit circle with many points labeled, pie charts, histograms and more. There are even a few geometric surfaces and a polyhedral frame. She has mathematical books, and statistical software is open on her computer. We found it interesting that someone gave a lot of thought to the kind of space that a sophisticated woman in her position would occupy. We have noticed that many of the mathematically talented women on TV in the last ten years have typically been young women, often students. Here it is nice to see someone further along in her career who has achieved a high level of success and is in a position of power. On a show where there are clearly supernatural events happening, she doesn't appear to be extraordinarily gifted. On the contrary, she has been working hard on the mystery of the resurrected. She also contradicts many other stereotypes of TV mathematicians. Socially inept—not Forrester. Mental illness—no. And she's no one's assistant.

CALL FOR NOMINATIONS

## The 2016 Kovalevsky Lecture

AWM and SIAM established the annual Sonia Kovalevsky Lecture to highlight significant contributions of women to applied or computational mathematics. This lecture is given annually at the SIAM Annual Meeting. Sonia Kovalevsky, whose too-brief life spanned the second half of the nineteenth century, did path-breaking work in the then-emerging field of partial differential equations. She struggled against barriers to higher education for women, both in Russia and in Western Europe. In her lifetime, she won the Prix Bordin for her solution of a problem in mechanics, and her name is memorialized in the Cauchy-Kovalevsky theorem, which establishes existence in the analytic category for general nonlinear partial differential equations and develops the fundamental concept of characteristic surfaces.

The mathematicians who have given the prize lecture in the past are: Linda R. Petzold, Joyce R. McLaughlin, Ingrid Daubechies, Irene Fonseca, Lai-Sang Young, Dianne P. O'Leary, Andrea Bertozzi, Suzanne Lenhart, Susanne Brenner, Barbara Keyfitz, Margaret Cheney, and Irene M. Gamba. Linda J.S. Allen will deliver the 2015 lecture at the 8th International Congress on Industrial and Applied Mathematics.

The lectureship may be awarded to anyone in the scientific or engineering community whose work highlights the achievements of women in applied or computational mathematics. The nomination must be accompanied by a written justification and a citation of about 100 words that may be read when introducing the speaker. Nominations are to be submitted as ONE PDF file via MathPrograms.Org. The submission link will be available 45 days prior to the deadline. Nominations must be received by **November 1, 2015** and will be kept active for two years.

The awardee will be chosen by a selection committee consisting of two members of AWM and two members of SIAM. Please consult the award web pages www.siam.org/prizes/sponsored/kovalevsky.php and www.awm-math.org/kovalevskylectures.html for more details.

## EDUCATION COLUMN

*Education Column Editor: Jackie Dewar, Loyola Marymount University,* jdewar@lmu.edu

# Sources of Cheer

*Ginger Warfield, University of Washington,* warfield@math.washington.edu

In my column last year I attempted to demystify at least a bit the clouds of information and misinformation swirling around the Common Core State Standards and the testing associated with them. Since then the clouds have grown denser and the speed of swirling higher. The issue of people confusing the Standards with the assessments being designed for them has now amplified the voices conflating the Standards as an educational goal with standardization as a political goal. The murkiness and the stridency of the national scene have both increased painfully.

So I am going to devote this column to two initiatives on the local Seattle scene that give me great pleasure, and that I fondly hope represent part of a larger collection of small bright lights around the country attempting to offset the swirling murk. Both are not-for-profit organizations that came into existence with the very focused goal of changing how people look at and feel about mathematics. Since a very large part of people's mathematical identity is established before middle school, both had an initial focus on changing the culture of mathematics in local elementary schools. From there they branched out somewhat differently, but I recently had the pleasure of listening to them comparing notes on where they had gotten to and what they are headed for, and finding that they had much in common.

The most visible contrast between the two is their size. I shall start with the smaller one: Math for Love (mathforlove.com). Math for Love consists of two people, Dan Finkel and Katherine Cook. Dan's father did innovative teaching at the university level, and Dan, in the course of earning his doctorate in algebraic geometry at the University of Washington, accepted every opportunity to involve himself in educational issues, including taking part in a very lively NSF GK–12[1] project that let graduate students involve themselves in middle schools. Katherine is his wife and shares his enthusiasm. They are a dynamite team. For a start, their website is so full of fascinating links that I think it could be cited for entrapment. I was particularly intrigued by one path that I got enticed along. It started with a bunch of puzzles Dan contributed as guest posts on *The New York Times* Numberplay column, then moved on, by way of an inquiry from the column host, to how Dan had come up with one of them. He likes to go into classrooms and get kids excited about mathematics, but the last thing he wants is for the exciting mathematics to be something associated with him and disassociated from the teacher and the curriculum. So he gets teachers to give him unloved worksheets that include required material. One that he was handed on obtuse and acute angles was so mind-numbing that he got nowhere until Katherine looked over his shoulder and said "Put them in a circle!" From that suggestion developed a challenge that kept the kids on their toes for a whole math period—and several contributors to the Numberplay column on theirs for longer than that—coming up with conjectures and generalizations. Now that's mathematics!

The website also lists activities ranging from Math Circles (enrichment classes before and after school) and summer camps to professional development for teachers and tutoring for students. They also host an annual Julia Robinson Festival, which would be worth a column in itself. And to top it off, they have just invented and published a board game with the richest combination of surreptitiously getting kids to practice their basic operations while enticing them into deeper and deeper appreciation of the power of prime numbers than I have ever encountered. It's called Prime Climb, and Amazon (of course) has it.

Meanwhile across town Seattle has Zeno (zenomath.org), which is the rebranded version of what used to be called Explorations in Mathematics. It has a similar genesis to Math for Love: a couple of people set themselves to change the mathematics culture in a couple of elementary classrooms. The point of divergence is that in Zeno's case a bunch of parents caught on to what they were doing and said, "This is something that all children should experience—let's see how we can get to more of them!" Included in the original collection of teachers, administrators, mathematicians, and parents were folks with the vision and the expertise to build a thriving nonprofit organization and interest a number of local businesses in supporting it. And impressively, while building a support community whose recent fund-raising evening netted a cool $145,000, they have solidly maintained

*continued on page 12*

[1] From www.gk12.org: The NSF Graduate STEM Fellows in K–12 Education (GK–12) Program supports fellowships and training for graduate students in science, technology, engineering, and mathematics (STEM). Through interactions with teachers and students in K–12 schools, graduate fellows can improve communication and teaching skills while enriching STEM content and instruction for their K–12 partners.

the founding concept: to offer programs to elementary schools, with a sliding fee scale depending on socio-economic factors, and with a raft of options from math nights to math bulletin boards to mathematicians in residence all geared to produce changes the school can make its own in a few years. Then there are other pieces like the annual Math Fests where more than a thousand folks—kids and families and volunteers—gather in a huge gym to play all sorts of mathematical games (and, I would add, make quite a remarkable amount of noise!). Tremendously exciting all around!

Despite the differences in scale, these two excellent organizations have simultaneously arrived at similar points of view about the next important step. Their perspectives arise from noticing that many bright, willing, wonderful children arrive in kindergarten having had no exposure to basic ideas of numbers and shapes. Children who have played counting games and had conversations about how many corners a table has are at a tremendous advantage, and it is incredibly difficult to lift kids past the educational inequity resulting from a lack of such everyday mathematical experiences. For years now people have been working on the literacy version of this inequity, producing a lot of nifty programs supported by schools and libraries and community organizations. The time has come to address the mathematics version—and both Math for Love and Zeno are working on it. Early days yet, but I heard discussions of easy games, and packets to send home with families, and ways to encourage parents. A huge project to tackle, but they are off to a good start.

As I said, when the downsides of the current K–12 scene begin to get to me, I have a place to focus to cheer me up. Two of them, in fact!

## AWM Workshop for Women Graduate Students and Recent PhDs

For many years, the Association for Women in Mathematics has held a series of workshops for women graduate students and recent PhDs in conjunction with major mathematics meetings.

**WHEN:** Pending funding, an AWM Workshop is scheduled to be held in conjunction with the SIAM Annual Meeting, Boston, MA, July 11-15, 2016.

**FORMAT:** The workshop will consist of a poster session by graduate students and two minisymposia featuring selected recent PhDs, plus an informational minisymposium directed at starting a career. The graduate student poster session will be open to all areas of research, but the two research minisymposia will focus on **Dynamical Systems with Applications to Biology and Medicine**. Pending funding, AWM will offer partial support for travel expenses for twenty participants. Departments are urged to help graduate students and recent PhDs obtain supplementary institutional support to attend the workshop presentations and the associated meetings. All mathematicians (female and male) are invited to attend the program.

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

**ELIGIBILITY:** To be eligible for selection and funding, a graduate student must have begun work on her thesis problem, and a recent PhD must have received her degree within approximately the last five years, whether or not she currently holds a postdoctoral or other academic or non-academic position. All non-US citizens must have a current US address. All selected and funded participants are invited and strongly encouraged to attend the full AWM two-day program.

All applications should include:

- a cover letter
- a title and a brief abstract (75 words or less) of the proposed poster or talk
- a concise description of research (one-two pages)
- a curriculum vitae
- at least one letter of recommendation from a faculty member or research mathematician who knows the applicant's work is required for graduate students and recommended but not required for recent PhDs. In particular, a graduate student should include a letter of recommendation from her thesis advisor.

Applications must be completed electronically by **November 1, 2015**. See http://www.awm-math.org/workshops.html.

## BOOK REVIEW

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

**The Mαth βook: From Pythagoras to the 57th Dimension, 250 Milestones in the History of Mathematics**, Clifford A. Pickover. Sterling Publishing, 2012, ISBN 978-1-4027-8829-1.

*Reviewers: Sarah J. Greenwald and Jill E. Thomley, Appalachian State University*

Recently we had the opportunity to review *The Mαth βook* by Clifford Pickover for the *Notices* [3]. The book is lovely to look at, with full-color illustrations and an eye-grabbing cover. It also won the 2011 British Society for the History of Mathematics Neumann Prize, which is awarded every two years for the "best book in the history of mathematics aimed at a broad audience" [1]. So, imagine how flabbergasted we were to turn a page and see previously debunked fallacies in an article on Hypatia of Alexandria. It immediately reminded us of Marge Murray's fascinating four-part series on "Women Mathematicians on the Web" [4, 5, 6, 7]. Like Murray, we are very interested in representations of female mathematicians in print and online, as well as how errors in the history of women in mathematics can continue to propagate, so we'll focus mostly on these themes in this review.

First, let's step back for a moment to give some additional context. *The Mαth βook* contains 250 stand-alone articles, each with an accompanying image. We like many things about the book, which are detailed in our *Notices* review. In particular, we were pleased to find that Pickover focuses on so many individual mathematicians. Some, like Hypatia, are the subject of their own articles. Others are mentioned in articles on a diverse range of mathematical objects and people. We also appreciate that Pickover refers to people by their full names each time they are mentioned in a new article, since using full names helps to humanize people and highlights those who have female sounding first names.

The theme of people begins on the inside flap of the front cover, which poses three questions that are clearly intended to grab a reader's interest—the second asks, "Why was the first woman mathematician murdered?" Yikes! This comes across as rather sensationalistic to us. Unfortunately, that cover question is not merely a clever hook for the reader, it is also the primary focus of the article about Hypatia, rather than information more explicitly connected to mathematics history. Pickover briefly connects Hypatia's death to the end of Greek progress in mathematics and the beginning of Hindu and Arab ascendance during the Middle Ages, and also mentions Renaissance mathematician Maria Agnesi. The book would have been better served had he elaborated more on those connections, using what we do know about Hypatia and her work, and less on the more salacious and imagined details of her unfortunate death. The image accompanying the article is a sexualized image of a youthful and European-looking Hypatia with long, flowing blond hair and one exposed breast, supposedly just before her death—the painting *Hypatia* (1885) by Pre-Raphaelite artist Charles William Mitchell. Sadly, these kinds of unsupported details are not limited to the discussion of how she died. Among other fallacies included in the article is one asserting that Hypatia herself said she was "wedded to the truth."

Why aren't mythical phrases like these, which have been debunked in the scholarly literature, recognized as fiction online and in books? While electronic archives put a wide range of information virtually at one's fingertips, in many ways the internet is biased towards self-perpetuating these kinds of quotes and details, however false they may be. Like the cover flap of Pickover's book, the details are what are interesting and eye-catching, providing color and background, and hence they are popularized and reproduced in webpages and other sources. In the case of Hypatia, some of the myths can be traced back to Elbert Hubbard's 1908 fictional account of Hypatia's life in *Little Journeys to the Homes of Great Teachers*, which was never intended to be taken as fact. They propagated through other sources such as Lynn Osen's 1975 book *Women in Mathematics* and now through Pickover's work. In fact, when we search the web for phrases like "wedded to the truth" with Hypatia, what first appears are references citing Pickover and his books. Discussions and citations that debunk these phrases are not readily found on an internet search. Pickover is a prolific author and his books are well known and generally respected, so they only help to perpetuate the myths. To double-check, we consulted Hypatia researcher Edith Prentice Mendez. She confirmed that there is no evidence about Hypatia's physical appearance. Given that Hypatia was born in Egypt, she may have looked like the Egyptian women of the day. There are also no surviving quotes by her. A variety of scholarly sources document what we do know about Hypatia, including Michael Deakin's 2007 book *Hypatia of Alexandria: Mathematician and Martyr*. Surprisingly, although Pickover

*continued on page 14*

cites Deakin's book as a reference, he doesn't seem to have used it as source material.

Thankfully, Pickover does a better job of representing the life and work of the other female mathematicians included in *The Math Book*. He provides a mix of interesting personal details to give a sense of them as individuals, but focuses on their mathematical contributions. Maria Agnesi, mentioned briefly in connection with Hypatia, is discussed in an article whose title explicitly cites her work: "Agnesi's *Instituzioni Analitiche*." Mary Everest Boole's book *Philosophy and Fun of Algebra* (1909) is also in the title of her article, which includes quotes from her about her work. Emmy Noether and Sofia Kovalevskaya have their own articles, and in these Pickover discusses their diverse accomplishments as mathematicians. He also addresses the professional difficulties all of these women faced because of their gender, and in the case of Kovalevskaya, her religion. Some women appear in the context of other articles. For example, Agnesi is mentioned for a third time in the article on Kovalevskaya. Laura Bassi appears in both the Agnesi and Kovalevskaya articles. These recurrences provide a sense of historical connectivity between some notable historic female figures.

The historical connections in the book are not limited to female figures. Many links between men and women are included among the articles. However, we noticed one interesting case of gender imbalance involving Mary Everest Boole. In her own article, she is specifically listed as "the wife of George Boole," and yet in her husband George Boole's article, she is mentioned only by the generic

## NSF-AWM Travel Grants for Women

**Mathematics Travel Grants.** Enabling women mathematicians to attend conferences in their fields provides them a valuable opportunity to advance their research activities and their visibility in the research community. Having more women attend such meetings also increases the size of the pool from which speakers at subsequent meetings may be drawn and thus addresses the persistent problem of the absence of women speakers at some research conferences. The Mathematics Travel Grants provide full or partial support for travel and subsistence for a meeting or conference in the applicant's field of specialization.

**Mathematics Education Travel Grants.** There are a variety of reasons to encourage interaction between mathematicians and educational researchers. National reports recommend encouraging collaboration between mathematicians and researchers in education and related fields in order to improve the education of teachers and students. Communication between mathematicians and educational researchers is often poor and second-hand accounts of research in education can be misleading. Particularly relevant to the AWM is the fact that high-profile panels of mathematicians and educational researchers rarely include women mathematicians. The Mathematics Education Research Travel Grants provide full or partial support for travel and subsistence for

- mathematicians attending a research conference in mathematics education or related field.
- researchers in mathematics education or related field attending a mathematics conference.

**Selection Procedure.** All awards will be determined on a competitive basis by a selection panel consisting of distinguished mathematicians and mathematics education researchers appointed by the AWM. A maximum of $1500 for domestic travel and of $2000 for foreign travel will be funded. For foreign travel, US air carriers must be used (exceptions only per federal grants regulations; prior AWM approval required).

**Eligibility and Applications.** These travel funds are provided by the Division of Mathematical Sciences (DMS) of the National Science Foundation. The conference or the applicant's research must be in an area supported by DMS. Applicants must be women holding a doctorate (or equivalent) and with a work address in the USA (or home address, in the case of unemployed applicants). Please see the website (http://www.awm-math.org/travelgrants.html) for further details and do not hesitate to contact Jennifer Lewis at 703-934-0163, ext. 213 for guidance.

**Deadlines.** There are three award periods per year. Applications are due **February 1**, **May 1**, and **October 1**.

moniker "wife." This is one of the only times in the book that we noticed a known person not specifically named within an article. In addition, her husband's article relays a story about her showering him with water as a remedy for illness. Perhaps the omission of her name in this context was intentional, to separate out the idea of "a remedy should resemble the cause" as a folk myth.

There are numerous other representations of women in the book, showcasing them in diverse settings. We like that there are myths, words problems and other instances where he used female pronouns when it would have been just as easy to use male pronouns, such as in the case of a surfer scenario in an article on Viviani's theorem. "Euclid's *Elements*" presents an interesting frontispiece from the middle ages. In this image, a woman teaches geometry using construction tools, although Pickover doesn't address her in the article. Perhaps he didn't want to get into the idea that she may be the personification of geometry. Allyn Jackson, current Senior Writer and Deputy Editor of the *Notices of the AMS*, is quoted in the article on Boy's surface. Pickover describes her as a "mathematics journalist" (she holds a master's degree in mathematics but has previously self-identified as a journalist). The same description is used for Ivars Peterson, who was the Director of Publications for the Mathematical Association of America at the time the book was published. Perhaps it serves to highlight another career path for mathematicians, either female or male: writing about mathematics and mathematics history for broader audiences. Some of the representations are more effective than others. We didn't know what to make of the statement "No women like all women who dislike some women" in an article on Aristotle's *Organon*. For the Ishango bone, Pickover notes the possibility that "menstruation created mathematics." He refers to it as a slogan, which we thought was an odd way of discussing the theory. Even stranger, in the discussion of a backgammon set and die from Persia, Pickover diverts from mathematical connections of dice, the title of the article, to the excavation of an artificial eye, "which once stared out hypnotically from the face of an ancient female priestess or soothsayer." The only connection is the excavation site. Overall, we liked the diversity of representations, but the book could have been improved by explaining or leaving out some of the more questionable ones, and by including more recent women. There are very few after Noether even though the "milestones" are dated through 2007.

Pickover has published quite a number of books whose aim is to engage a broad audience with interesting stories of mathematics and mathematics history, including some

*continued on page 16*

CALL FOR NOMINATIONS

## The 2017 Noether Lecture

AWM established the Emmy Noether Lectures in 1980 to honor women who have made fundamental and sustained contributions to the mathematical sciences. In April 2013 the lecture was renamed the AWM-AMS Noether Lecture and starting this year has been sponsored by AWM and AMS. 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, Lai-Sang Young, Ingrid Daubechies, Karen Vogtmann, Audrey Terras, Fan Chung Graham, Carolyn Gordon, Susan Montgomery, Barbara Keyfitz, Raman Parimala, Georgia Benkart and Wen-Ching Winnie Li.

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. Nominations are to be submitted as ONE PDF file via MathPrograms.Org. The submission link will be available 45 days prior to the deadline. Nominations must be submitted by **October 15, 2015** and will be held active for three years. If you have questions, phone 703-934-0163 or email awm@awm-math.org.

science fiction novels. After reviewing *The Math Book*, we would agree that he is a great storyteller and that this book is interesting recreational reading. It could even serve as a jumping-off point for someone who wants to delve more deeply into history, since he includes people's full names, as well as further readings for each article. At the same time, we would note that there can be a very fine line between historical events written in an accessible story-like manner and fiction—one that Pickover steps over at times in his work. There is nothing wrong with including fictional ideas and events in a non-fiction work, but they need to be identified as such; otherwise these can continue to propagate as fact through the literature and on the web, as Pickover's already have.

**Further Readings:**

[1] British Society for the History of Mathematics (BSHM). "Winner of the 2011 Neumann Prize Announced" [Press release]. 2011.
http://www.dcs.warwick.ac.uk/bshm/BSHM%20Neumann%20Prize/neumann%20prize%20press%20release%202011.pdf

[2] Deakin, Michael. *Hypatia of Alexandria: Mathematician and Martyr*. Amherst, New York: Prometheus Books, 2007.

[3] Greenwald, Sarah and Jill Thomley. "The Math Book." *Notices of the AMS* 62(4), April 2015, pp. 384–385.
http://www.ams.org/notices/201504/rnoti-p384.pdf

[4] Murray, Marge. "Women Mathematicians on the Web, Part I: A Story About Yale." *AWM Newsletter* 42(3), May–June 2012, pp. 10–12.
http://www.drivehq.com/file/df.aspx/isGallarytrue/shareID8755087/fileID1725371446

[5] Murray, Marge. "Women Mathematicians on the Web, Part 2: Finding the First." *AWM Newsletter* 42(4), July–August 2012, pp. 11–15.
http://www.drivehq.com/file/df.aspx/isGallarytrue/shareID8755087/fileID1725373712

[6] Murray, Marge. "Women Mathematicians on the Web, Part 3: Wikipedia." *AWM Newsletter* 42(5), September–October 2012, pp. 16–19.
http://www.drivehq.com/file/df.aspx/isGallarytrue/shareID8755087/fileID1725389501

[7] Murray, Marge. "Women Mathematicians on the Web, Part 4: The Virtual Reference Shelf." *AWM Newsletter* 42(6), November–December 2012, pp. 21–26.
http://www.drivehq.com/file/df.aspx/isGallarytrue/shareID8755087/fileID1725397250

# A Conversation with Katie Steckles and Laura Taalman

*Interviewer: Evelyn Lamb, postdoc, University of Utah. She blogs about math for* Scientific American *at Roots of Unity and for the American Mathematical Society at the Blog on Math.*

Katie Steckles is a math communicator based in Manchester, England. Laura Taalman is a Professor of Mathematics at James Madison University who has been on leave to work first as the Mathematician-in-Residence at the Museum of Mathematics in New York City and now as Senior Product Manager for Education at the 3D-printer company MakerBot in Brooklyn. Both of them helped organize the MegaMenger worldwide fractal build this past fall. (I helped organize a build with the University of Utah AWM and SIAM chapters.) We chatted on Skype in January. This is an abridged and edited transcript of our conversation.

**EL:** We'll start off with a softball: how did you get interested in math?

**KS:** It's a bit strange for me because when I was at school, there were a lot of subjects that I was into and that I was good at, and I kind of wasn't sure what I wanted to do. I chose my A-levels by deciding that I wanted to do medicine. I was watching a lot of *ER* at the time, and I thought that would be a good thing to do. I think at that age, you don't really know what you want to do. But I had to pick subjects, and they said that for medicine you definitely need biology, and you probably also want maths. And having done maths to that level, I realized there was so much more to it than we'd done prior to that. That's when it starts to get really good. Then when I finished my A-levels, I'd gone off medicine. It turns out when you get into something from watching a TV show, it's usually a phase.

I kind of wanted to pick something that wasn't going to point me towards one particular career, something that left things a bit open. Because I'd found all of this really cool stuff doing my A-levels, I thought I'd do maths. It doesn't seem to have a specific job that you go onto from it. There are a lot of options. A lot of people said that having a degree in maths will do you well for any kind of job. If you want to go into management or anything like that, they'll take a degree in maths as a sign of good intelligence or whatever. So I thought, that sounds interesting. The more I did, the more I wanted to do it. By the time I finished my degree, all of my friends were doing PhDs, which sounds like a really stupid reason to do a PhD. But all of us went up together and did PhDs together, and it was great. I was like, really? Do you think I could? I wasn't sure if I was that good at maths, and everyone was like, of course you are, you've just finished a degree in it, you did really well, what are you talking about? And I thought maybe they were right. Because of that, I went on to a PhD.

It's a way of thinking for me. I've always had an approach to things that's been quite mathematical. Maybe without realizing it, I've always been a mathematician.

**LT:** That's really interesting. That's very different from what my path was. I always knew that I wanted to do math, from second grade or something, but I didn't know what that meant. I came from a little town, so I was always pursuing math, but I didn't know you could major in it. I didn't know that you could go to grad school in it until almost the end of college. I was just in this little bubble. I always knew I wanted to do it, but I didn't really know how to do it. It sounds like you knew exactly what you were supposed to do, but you didn't know what you wanted to do, so it's kind of the opposite.

For me, math has always been a very escapist thing to do. I can sit in a coffee shop, and twelve hours go by where I'm not really worried about anything. I really like that.

**EL:** Both of you now do public math outreach as your career. (I know, Laura, you're also on leave from James Madison.) So how did you get to the public math outreach career thing?

**KS:** It was almost completely by chance. While I was doing my PhD, there was an email that went around about a maths outreach project that somebody was trying to put together. It was Maths Busking, a street performance maths thing. It was a bit weird. I like explaining maths to people, and I like making an idiot of myself in the street, so I thought maybe this would work as a combination.

I went along to the first couple of training sessions, and it was really interesting because they were sort of looking at it as an approach of using techniques from street performance and the way that they engage people in that kind of environment to try and communicate maths. If you're at a conference, and you've got a fun bit of maths that you want to show people, you can just talk to people about it, and they'll say wow, that's really cool. The idea was trying to take that outside of mathematicians, to take that out to other people as well because we're sure they'll find things really cool as well. And that was kind of my first taste of it.

It's quite an extreme form of maths communication

*continued on page 18*

because you kind of walk up to someone in the street and say, hey, do you want to see some maths? And they say, noooo. And then they walk away. You actually have to approach it quite carefully. A lot of the stuff we did was at science festivals and places where people were expecting it a little bit. But we did actually take it onto the street near some real buskers, which was a bit terrifying. They don't like it when you do busking and don't ask for money. Then people expect them to do it for no money. We've done it in various places, and that was kind of the first thing I did. Through that I met a bunch of other people who do maths engagement.

The first point I really realized it was what I wanted to do for a job was when there was a conference in Manchester that was essentially a maths communication conference. It was called "How to talk maths in public." They got together everyone from people who give maths talks to people who run things at science festivals to maths people who write books or make TV programs, anyone involved in communicating maths in any form. That was very cool because I got to meet some mildly famous maths people. Simon Singh was there, Ian Stewart was there, and a bunch of other people I'd seen and heard of, lots of people who just do it for a living. I thought, oh, this is a job. This is actually a thing people do for a living. At that point I was looking for something to do

## AWM Workshop for Women Graduate Students and Recent PhDs at the 2016 Joint Mathematics Meetings

*Application deadline: August 15, 2015*

For many years, the Association for Women in Mathematics has held a series of workshops for women graduate students and recent PhDs in conjunction with major mathematics meetings. Pending funding, an AWM Workshop is scheduled to be held in conjunction with the Joint Mathematics Meetings in Seattle, WA, January 6–9, 2016.

**FORMAT:** The new format, which started in 2013, presents research talks focused on a research theme that changes from year to year. In addition, a poster session for graduate students includes presenters from all fields of mathematics. The AWM Workshop talks in Seattle in 2016 will focus on **Algebraic Combinatorics**. Participants will be selected in advance of the workshop to present their work. Recent PhDs will join senior women in a special session on **Algebraic Combinatorics** where they will give 20-minute talks. The graduate students will present posters at the workshop reception and poster session. Pending funding, AWM will offer partial support for travel and hotel accommodations for the selected participants. The workshop will include a reception and a luncheon. Workshop 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 talks and poster presentations. Departments are urged to help graduate students and recent PhDs who are not selected for the workshop to obtain institutional support to attend the presentations.

**MENTORS:** We also seek volunteers to act as mentors for workshop participants. If you are interested in volunteering, please contact the AWM office at awm@awm-math.org by **September 15, 2015**.

**ELIGIBILITY:** To be eligible for selection and funding, a graduate student must have made substantial progress towards her thesis and a recent PhD must have received her PhD within approximately the last five years, whether or not she currently holds 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 title of the proposed poster or talk
- an abstract in the form required for AMS Special Session submissions for the Joint Mathematics Meetings
- a curriculum vitae
- 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.

Applications (including abstract submission via the Joint Mathematics Meetings website) must be completed electronically by **August 15, 2015**. See https://sites.google.com/site/awmmath/programs/workshops for details.

when I finished my PhD. I wasn't sure I wanted to stay on in research. I think there was a certain amount of research that I could handle, and I was getting near the end of it. It worked out well. I did one PhD and that was it. That was just about the right amount for me. I thought, if this is a job, I'll give it a go. I'll give it six months, and I'll try being a freelance maths communicator. I got a few bits of work through some contacts I'd made, and it worked out. I was quite lucky. I don't know if it was luck or just the fact that I kept turning up to things, and people were starting to notice who I was. It's gradually built up into what I do now.

**LT:** Can you give an example of something you did on the street? I want to know.

**KS:** We did loads of stuff. There's a little trick you can do that uses binary numbers where you have little cards with different sets of numbers on each card, and you can use it to guess which number someone's thinking of. Just by giving five bits of information, you can guess a number between 0 and 31! That was a nice one to do.

You can sort of impress people: "I'm reading your mind. Oh wait no, I'm doing maths!" They want to know how that works. I never had to ask if they wanted me to explain how it works. Some people half had an idea. It was really nice to be able to engage people to whatever level they wanted about things.

**EL:** Laura, how did you end up working for the Museum of Mathematics?

**LT:** Well, it's complicated. I'm solving a two-body problem. Fifteen years ago my husband followed me from graduate school to my job at James Madison University. He has like the one tech job in our town. He didn't want that job anymore, so we thought we'd go to New York City and see what could happen.

I'm on leave, not on sabbatical, so I needed to get a job. I'd been working at the math museum on some things. We had a recreational math research conference and other little things. They helped me get a position here so I could work with them this year, which has been really cool. It's very different than what I'm used to.

There's a lot more opportunity to talk about math with people with a huge range of ages. At the first workshop here, I had a kid that was 7 and a guy that was 73 or something at the same 3-D printing workshop. So that was really cool.

**EL:** One of the things that you did there was Mega-Menger. You were one of the people behind it, and I know Katie, you did a ton of organizational stuff for it too. So tell me about that fantastic, or possibly terrible, idea.

**LT:** It was a fantastic and a terrible idea! Katie really made everything happen. It was the most fun thing I've done here at the museum. We had a ton of people coming in and making cubes and learning about Menger cubes. It was really exciting. I think it did start from a crazy idea, that somehow Matt [Parker] managed to make happen for real with Katie. Do you want to talk about it? You guys have really been the driving force of organizing everything.

**KS:** Yeah, one of the people that I've worked with quite a lot is Matt Parker, and he's quite often coming up with ideas for things, and part of my job at the moment is to make Matt's ideas into things that happen.

Matt ran into Laura at the Gathering for Gardner. I think Matt had vaguely seen me playing around with the Business Card Menger Sponge before, and he knew it was a thing that I knew how to do. He thought, oh, we could do that. From there, it just snowballed into this thing. You build something out of 20 cubes. If you have 20 of those, you can build a bigger one, if you have 20 of those, you can build a bigger one. He realized that if we just got 20 different people do to it, that would count as the next level up, even if we didn't bring them together.

**LT:** He told me that you'd done something where the design of the Sierpinski carpet was actually printed on the card so that the level looked higher. When I heard that, I was like, I'm totally stealing that idea. I'll go back to the museum, and we'll make Menger cubes with these cards. We were talking about how you can't make a level four, how it's too heavy, and thought, well, there is a way.

He talked about this thing where people made the world's largest octahedron, standing at different places of the earth. I don't remember if it was a tetrahedron or an octahedron, but they measured out the coordinates. So this conversation kind of snowballed to what if we made 20 different sites around the world each build level threes? We'd have a level four sitting around the world the same way. Was that a project that you did, this around the world octahedron?

**KS:** No, that was someone else. I'd not heard about that, but it sounds very cool, to get the right coordinates. We thought about whether that would work for the Menger sponge, but we didn't know if there was enough land mass. Someone would just have to be on a boat in the middle of the ocean.

I think it was originally Matt who had the idea of printing the Sierpinski carpet onto a bit of card. I was doing small workshops with groups of kids building a level one Menger sponge. Combining all those ideas, it sort of became this behemoth thing.

We put a call out asking who wanted to build a Menger sponge. We knew we'd make one in Manchester, and we

*continued on page 20*

could definitely get one in London because Matt knows enough people there. Laura was doing one in New York. We have a friend in New Zealand, and she got the University of Auckland on board. They did it at the local art gallery, and it was a really fantastic community event. Matt's got some contacts in Canada at the Perimeter Institute for Theoretical Physics, and they were all over it! They prepped beforehand and made the whole thing in a day with a team of 50 people. He's been out to Finland, and there were some people up for doing it in Finland as well. We just emailed people and asked who was up for doing this. It's quite a lot of work.

**EL:** Yeah, it is. I was thinking, oh yeah, sure, we can do that. Then I looked at how many people we had and how much work the level three was, and we decided that level two was where we needed to be.

**LT:** I told the museum, I want to do this, I want to make this level three Menger cube, and they said, have you ever done this before? I said, well I've made a level two, and that was fine. This is just 20 times that, so I'm sure that with a lot of people it'll be fine. They said, OK, but you have no staff and no budget. It's a really large project. I was worried we wouldn't be able to do it until you guys figured out how to get funding.

**KS:** We had an idea that we would try to get someone to sponsor it because it is a lot of stuff to pay for. In theory, you could get cards donated, but it would be so much effort. We'd much rather have the thing actually work than try on no budget and have it fail because no one managed to get it together. Matt's technically based at Queen Mary University. He's the Public Engagement in Mathematics Fellow. Because he's based there, he got in touch with them and asked if they'd be willing to sponsor it. They were like, would we like our logo on a million bits of card spread all over the world? Yes please. They covered basically all the printing that people couldn't afford to cover themselves.

It was a lot of work to pull everything together. For a long time, we didn't even know what the 20 sites would be. I think in the end we ended up with 23 actual sites for building level threes, which is good because if some of them didn't finish, it would be OK. I was just looking through the final numbers. In the end, we had 17 finished level threes, another 5 sites that had partial level threes, which adds up to a total of two level threes, and we've got 23 level two sites, so we've got more than a level 4 altogether. There are still a few in progress.

We've got all the pictures with the finished ones. It's just brilliant to see because they all look the same! It's terrifying that they're all this identical thing, but that's the idea, that they're just all these copies of the same thing.

**LT:** Tomorrow I get to see one. It's actually ours, but it moved. We can't keep it here, so a middle school took it. So one night, we were all walking outside the Museum of Math carrying this giant Menger cube into a moving truck they got. Now it's at this middle school, and I get to visit it tomorrow morning and see how it's doing. I hear it's doing fine.

**KS:** They sometimes sag a little bit on the joints along the top. There's quite a lot of weight there.

**LT:** I like to think that so many people from all the different sites all around the world had the same problems that we did. We're all these experts in this really restrictive task.

**KS:** You develop special terminology. Someone commented on that while we were building in Manchester. We were referring to things by names that we'd made up for them, things that made sense to us. They were like, you're just inventing new terminology for everything. I said, well, that is what maths is. That's all maths is, just inventing names for things that already exist. I mean, it depends on your philosophical point of view is, but to some extent, maths is all about notation, and it's all about making names for things.

I'm going to see the Cambridge one on Thursday. They want me to come and give a talk on fractals. It's got a lot of photos of Menger sponges. On Friday I'm going to the Manchester one, which is just around the corner from where I live, and start to disassemble it. It's really sad, but they need the space back. I've contacted all the volunteers who helped to build it, and at least three or four said they'd like a level two sponge. We're going to decompose it into smaller bits.

**EL:** I kept a level one sponge. We ended up accidentally making too many because counting is hard.

**KS:** I know someone built a coffee table on top of a level two.

**EL:** What are some of the challenges of math outreach, or the things that are more difficult than you might think they would be?

**KS:** There are probably a lot of things about math outreach that are exactly as difficult as you expect them to be. Some people just don't like maths. There's no real reason they don't like maths, they just don't. Maths has a bit of an image problem that you have to deal with from the outset. Different people have different ways of doing that. Mine is just to be relentlessly enthusiastic about maths until people realize I'm not going to shut up and they should probably listen.

I work with a lot of people who do general science outreach as well. There are a lot of techniques that we can share, but one of the big differences is that they've got these demos. They're always talking about what demos they're using. Are you going to explode something? There are so

many different things you can do with chemistry or biology. It's a bit more accessible for people. They can see something happening. Whereas with maths—to me, this is one of the best things about maths—a lot of it is in your own imagination.

This talk I'm giving about fractals, something I say in it is that this is a thing that doesn't really exist. You can't build a fractal in the real world. You can build an approximation of a fractal, but there is a smallest thing in the universe, or at least I'm told so by some physicists. There is a smallest thing that there can be, so there's no way you could ever make a true fractal. There's no way you can iterate to infinity because you'd never finish doing that. It would take ages, you'd be really bored, and physically it's not possible. To me, that makes fractals better because they can only exist in your mind.

It's a challenge in some ways, and it's also a gift in other ways because that means you get to do things quite stripped down. You don't need to take a lot of equipment around with you. You can just go and explain things and show pictures. Equally, it's more of a challenge to engage people in doing stuff because you have to get them to think, and sometimes people aren't prepared to do that.

**LT:** Yes, it's that first hurdle. Once they're in and listening to you, I find people saying wow, I didn't think math was so interesting. But to get them over that line where they're actually listening to something, that's hard.

The last couple years I've been doing all this 3-D printing, which is kind of the opposite of not having things exist. You have to actually make things exist. It's been really interesting because some things I've only thought about in my brain I now have on my desk. In addition, it helps me get people over that hurdle. At James Madison, I was teaching these general education classes about 3-D printing. It's not a class about mathematics, but they'd be modeling, writing up some code to do something, and they'd say, "Oh, I need to rotate this. I need it to have exactly this many copies and spiral up as I rotate it." Hm, I wonder what field we could use to figure out how to do such a thing?! And the next thing you know, they have to know about some basic trigonometry or something to make that happen, and they're interested because they want to make it.

I think some people need a reason to want to know something, which isn't common for math people. We don't need a reason, we just want to know about some made-up stuff, but I find getting people over that hump has been easier since I started doing the 3-D printing. They hold it in their hands: what's this, tell me about this thing that you just put in my hand. They can see it and touch it, and if they want to make it, they need to know something.

**KS:** I've definitely heard people talk about the way maths is taught, because it's taught in quite a functional way, here are some things you'll be able to do. You'll definitely need this, so here's what you do. I think a lot of people need to have a reason to need to know something. If they can't see when they'll need to use it…. One approach that's been suggested has been to find things that people are interested in and show them the maths in them. And that's what you're talking about. If they want to 3-D model something, that's a huge amount of maths, and they need a huge amount of maths to play around with stuff. Until you're playing around, you don't know why you're learning something.

One of the ways Matt puts it is if you're learning to play football, you'll quite often practice dribbling a ball around some cones. That's a fantastically useful thing to practice if you're going to go on and play football. But if all you ever do is dribble around cones, you think it's rubbish. Who wants to do that? Until you actually play a game of football, you don't see the benefit of that. At school, people are often taught maths in a way that means they never have a chance to play a game of maths. Whereas when you've got a real-world problem that you want to know the answer to, and you can use maths to get there, that really helps. But it's a question in terms of maths education of juggling things people need to learn and having good motivating examples, not just ones that are made up.

**LT:** I really believe that in addition to doing that, and I think you're saying that too, it's so important to have the skill of wanting to know something for no practical reason at all. At the museum, we have volunteers who present the exhibits. They'll ask me, what is the practical application of this that I can tell visitors? And I'll say that there is no practical application, and that's the whole point. This is the thing we want to think about. We can stretch and say, well this type of math is used in encoding face recognition or compressing digital files or something, but that's not why it's there. It's there because that's something people want to think about. And we don't need to have a reason. Stop asking me what the reason is! We don't have to have a reason. Why did you write that poem? Why did you make that piece of art? Why did you write that book? What good is your book? Nobody asks that.

**KS:** A lot of people will ask that question. It's good to have an answer to the question in case someone asks. For some people, the answer of "because it's there" isn't a good enough motivation for doing something. I always equate doing maths with solving puzzles. When you're solving puzzles, there is a real enjoyment you get in the answer. There's a real motivation you get to find the answer and get to the end of the puzzle.

*continued on page 22*

Or even to just have fun along the way. People will happily do a Sudoku puzzle and get that kind of little buzz that you get from having finished something, having solved something. And that's exactly the thing you get from doing maths.

**LT:** That's right, they sit there on the train and do a Sudoku puzzle, and they love it. They just don't know that that's what they're doing.

**KS:** Sudoku's an interesting one because it is maths, but not in the way that people think it's maths. The fact that it's numbers is irrelevant to the group theory, the logic and inference. People associate it with maths even though it's not maths in the way they think it is.

**EL:** What is your favorite math to share with people?

**LT:** My family is really sick of hearing me talk about this. It's the Euler characteristic.

I had this license plate in North Carolina that said V-E+F=2. So it was amazing. I would drive home, and occasionally someone in my family would ask, what is your license plate about? And I said, well, let me tell you all about it. They'd start to say, don't ask her! Don't ask her what it is!

When I moved to Virginia, they wouldn't let me get that license plate, and I got into a real yelling argument at the motor vehicle department about the license plate. I was like, just type it! You have it right there! Type it in! I can see that you have "plus" on your keyboard, just type it in! And you can't fight with the people at the motor vehicle department because you'll get arrested, so I don't have that license plate anymore.

But I love that simple equation, and I love that it works for any triangulation. It contains a lot of things in math that I think are really important for a beginner to know about. This concept that it wouldn't just be true one way we divide a sphere up into triangles, but any way we do it. You can give a whole classroom of kids balloons and let them draw any triangles they want. They can even make squares and crappy triangles, and it's still going to work. Then they can count it up, and except for miscounting, because counting is hard like you said, they all get this pattern. They can discover it. It gets generalized into all kinds of things in homology and Chern classes that they don't know about. But they get to see that little piece. I like that.

Sorry, I got off on a tangent. The Euler characteristic. I think it's awesome.

**KS:** I'm really struggling to think of one thing. I quite often like maths that you can build and do things with. I do a lot of things involving origami and folding. Building fractals, believe it or not, is another hobby of mine. Making shapes, making Platonic solids, all of that kind of thing. Hands-on stuff.

But there are so many things I just love to tell people about. This thing with the binary trick where you add up the numbers. I got one in my Christmas cracker. My dad said, what's that? And I did the trick for him. He said, oh, that's really good. How does it work? And I explained it to him. Then my brother came in, and I did the trick for him. Then he asked how it worked, and I explained it to him, and my dad listened to the explanation again. Then someone else came in. My dad said, don't ask her how it works! She will explain it again!

I just relentlessly want to share with people the things that I find cool. We do MathsJam, which is maths in a pub, and people just bring things to play with. I like it when maths just happens. You're just getting on with your life, and then suddenly there's some maths. You're like, oh, there's some maths! It's just fantastic.

My other half is a mathematician as well. Wherever we go, we're looking for maths. Not consciously, but sort of subconsciously, we'll see something. "Hey, that's maths. Wicked!" We'll talk about it, investigate it. If there's anyone nearby, explain it to them.

## Expectations of Brilliance

*excerpt from Princeton University press release, January 2015*
http://www.princeton.edu/main/news/archive/S42/12/52Q28/index.xml?section=topstories

The stereotype that women lack natural "brilliance" could explain their underrepresentation in academia, according to new research based at Princeton University. The study, "Expectations of brilliance underlie gender distributions across academic disciplines," was published in the January 16, 2015 issue of *Science*. Researchers measured academics' belief that success in their own disciplines depended on raw brilliance. The researchers concluded that what they call "field-specific ability beliefs" ultimately put women at a disadvantage because of stereotypes that they lack innate intellectual talent, said Sarah-Jane Leslie, the study's lead author. This emphasis on brilliance exists almost as a secret password that precludes the value of other traits, such as hard work, passion, dedication or diligence. In the video https://www.youtube.com/watch?v=FM6mbSiD3eA, Leslie discusses the study.

*In Memoriam*

# Richard D. Schafer (1918-2014)

On December 28, 2014, Richard D. Schafer, emeritus professor and former deputy head of the MIT Department of Mathematics, died at the age of 96. His marriage to Alice T. Schafer, AWM co-founder and early president who predeceased him in 2009, lasted for 67 years. For an excellent description of his life and career, see http://newsoffice.mit.edu/2015/professor-emeritus-richard-schafer-former-deputy-head-mathematics-dies-0115. In this article, we will concentrate on our personal memories.

*Richard Schafer and Alice Turner on their wedding day*

To the best of my recollection, I first met Dick at a party at his and Alice's home in fall 1974. It was a lively gathering of MIT and Wellesley faculty, junior and senior, along with women mathematicians from the general Boston area. I'm not sure I saw him after leaving Massachusetts in 1975; I think he didn't much care for traveling to meetings after his retirement. Alice told me more than once that she could do all the traveling she wanted to, because Dick was very supportive of all her efforts, and he was happy to stay home and take care of their beloved cats. He was always proud of her work for AWM and was especially pleased when we inaugurated the Alice T. Schafer Prize for undergraduate women.

When Alice could no longer travel, we kept in touch mainly by exchanging Christmas cards. One year her handwritten notes were replaced by notes written by Dick, which continued a year or so after her death. When it became hard for Dick to write, his grandchildren helped him get the cards out, and it became his practice to include a picture of his great-grandchildren in lieu of a note. I'll miss seeing the kids' smiling faces each year. *—Anne Leggett*

---

When I first met Richard (Dick) Shafer, for me he was Alice's husband. This was in the early seventies when I was living in the Boston area and teaching at Clark University in Worcester. Alice and I quickly formed a friendship through our common interests, including issues of interest to women mathematicians. I soon realized that Dick was deeply interested in these issues as well, though his style was to discuss them in an analytic manner. His passion was opera. I found myself going to the opera with him and Alice, and this shaped an interest in that art form for me which has lasted to this day.

After Dick and Alice moved to Washington I visited them several times. I remember with pleasure a visit with Dick to the National Gallery, where we looked for a Vermeer. His interests in art were broader than opera! I also remember a visit to Moscow, where Dick, Alice and I coincidentally ended up staying in the same hotel and toured the city together. Dick constantly reminded Alice not to be too vocal in her criticisms! He was always the steadying influence.

The last time I saw Dick was in Boston in 2006. I was there for a conference and his son Richard kindly took me to the assisted living home where Dick and Alice lived. Since then I have received birthday cards and Christmas cards from Dick without fail, up until a few weeks before he died. The end of a long friendship is painful, but one has the wonderful memories. *—Bhama Srinivasan*

---

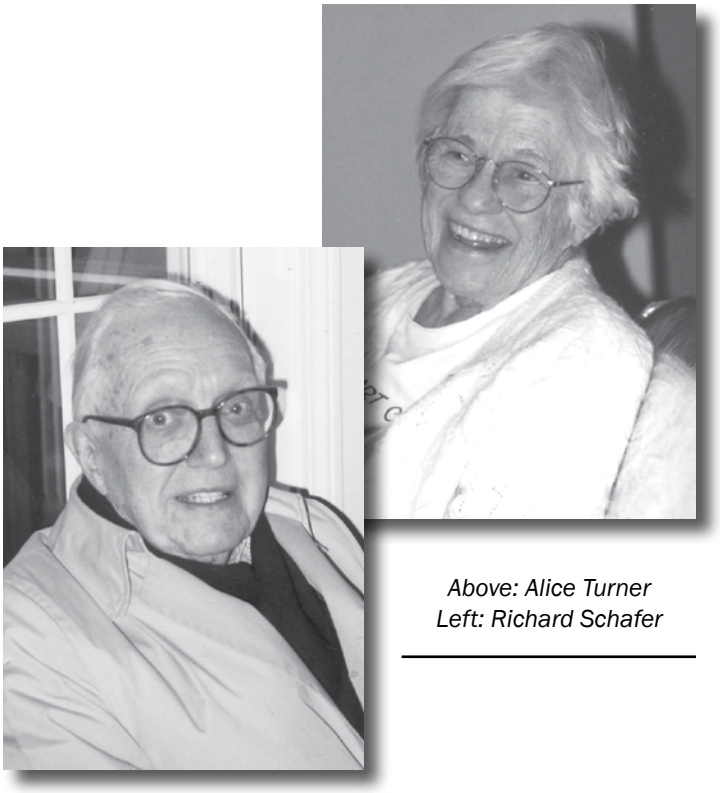
In June 1990, I joined a delegation led by Alice Schafer to meet women in math in China. I was the only middle school mathematics teacher on a trip with professional mathematicians and college professors—Alice warmly welcomed me aboard. Over the years, the delegation members kept in touch, and I was pleased when Alice and Dick Schafer decided to retire (for the second time) back to the Boston area. In the summer of 2000, I sent out letters inviting various friends in the area to help me start a new mathematics charity. Guess who showed up at the first meeting? Alice and Dick Schafer. They faithfully came to the meetings and contributed towards our getting up and running with valuable guidance on how to start a grassroots charity—after all, Alice had been one of the AWM founders and she knew it could be done. They were supportive over the years of

*continued on page 24*

helping the next generation of math students get their start. Dick and Alice served on the Board of the Somerville Math Fund until her health declined to the point of not being able to get around and participate.

I would visit them periodically in Brookhaven, enjoying discussions, often over a meal, about the latest news, books and stories of their life adventures and of mathematicians. Dick particularly enjoyed operas; in the first years there he would often travel to hear performances. Once Alice needed more assistance after a stroke, Dick would stay at home, giving up his travels to care for her. As Alice declined, Dick was her guardian angel—caring for her in their apartment, handling all of her needs until it was beyond his abilities—first adding extra help and then moving her into the nursing center. His love and care for Alice until her death was inspiring. He spent his days with her, be it in the apartment or down in the nursing center. After Alice died, Dick continued living in Brookhaven; eventually the challenges of aging took its toll and sent him to the nursing care center too.

His was a life well-lived. —*Erica Dakin Voolich*



*Above: Alice Turner*
*Left: Richard Schafer*

---

Picture a visit with the Schafers in early spring 2002 in their apartment at Brookhaven: an AWM mug is on the breakfast table, and a black-and-white tuxedo cat named Emmy (yes, she was named for Emmy Noether) is lying on top of a bookcase under the picture on the wall. Throughout the visit, Dick kept us entertained (sometimes in stitches) with instant recall of stories about mathematicians he had known over the years—there were plenty, numerous famous ones too. Most of us have to think a few moments for dates and details of something that happened decades ago, but Dick could come up with exact information without missing a beat.

After Alice had moved into a nursing unit due to a fall that broke some bones, Dick moved into a smaller apartment and visited Alice several times a day. When I asked on the phone about the cat (by then, a different cat named Chiquita), he was firm that he wasn't bringing the cat to visit, in case the cat got away and hid some place, he wasn't going to be able to deal with that. As Erica said above, he really was her "guardian angel," seeing to all her needs, including taking exquisite care of their last cat.

The last time I visited him was in January 2012 when the Joint Mathematics Meetings were in Boston. I asked Erica to drive me to Brookhaven, and we had lunch with him in the dining room there. I talked to him on the phone from time to time, about the books he was reading, the Metropolitan Opera in New York City, and his family … and the fact that food had texture that nutritional drinks did not. It was at the end of February this year when I called to wish him a happy birthday that I found out he had died. I was shocked: after JMM2015, I had sent him the two AWM flyers I picked up there, one of which has a picture of a young Alice in a "match-picture-with-name" game, and the mail had not been returned.

I met him through Alice, and he became a dear friend I will greatly miss. —*Pao-sheng Hsu*

# Announcements

## AWM at MathFest 2015

AWM is sponsoring two events at this year's MAA MathFest in Washington, DC. The organizers of both events are Alissa S. Crans, Loyola Marymount University; Jacqueline Jensen-Vallin, Lamar University, and Maura Mast, University of Massachusetts Boston.

"Contributions of Women to Mathematics: 100 Years and Counting" will be held Saturday, August 8, 3:30–5:00 p.m. In celebration of the 100th anniversary of the MAA, the AWM sponsors this session to acknowledge and recognize the contributions, achievements, and progress of women mathematicians over the past 100 years. This century has seen great mathematical achievements by women, the most recent and most public being Maryam Mirzakhani's winning the Fields Medal. To honor this and other advances in mathematics by women, this session welcomes talks about mathematics done by women and historical or biographical presentations celebrating women in mathematics.

The poster session "Highlights from AWM Student Chapters" will be held in celebration of the 10th anniversary of the formation of the first chapters. This program has expanded to fifty chapters and has impacted thousands of undergraduate and graduate women across the country. AWM Student Chapters sponsor and host a range of activities including invited speakers, Pi Day Celebrations, field trips, outreach programs to local schools, Sonia Kovalesky Days, and career panels. In this poster session, AWM Student Chapters are invited to share their stories, ideas, and successes with other AWM Student Chapters and with the mathematical community. See http://www.maa.org/node/614032/ for information on applying for the poster session; the deadline is **June 5, 2015**.

## New AMS Online Listings

The AMS now offers online listings for awards, fellowships, and other professional opportunities at http://www.ams.org/opportunities. Visitors to the page can search, browse, share, and post calls for fellowship and grant applications, prize and award nominations, and meeting and workshop proposals in the mathematical sciences. The page serves mathematics faculty/scientists, institutions, programs, postdocs/early-career mathematicians, graduate students, undergraduate students, high school students and teachers. The AMS invites you to submit calls for opportunities to this site. Once a submission is approved, users can respond directly to the contact or wesite provided in the call. Questions? Email opportunities@ams.org.

## AWM Matching Women Puzzles

The AWM Education Committee would like to bring the AWM Matching Women Puzzles to the attention of those of you who may have not picked up copies at the AWM table at the JMM. They're great! The pdfs are freely available at our website. Just go to www.awm-math.org and click on Math Fun & History. You'll find links to two versions on that page. (In case you're wondering why the pdfs have "yellow" and "green" in their names, those are the colors of the paper used by the AWM office when printing them up!)

## Call for Nominations for Norwood Award

The Department of Biostatistics in the School of Public Health, University of Alabama at Birmingham (UAB) is pleased to request nominations for the Fourteenth Annual Janet L. Norwood Award for Outstanding Achievement by a Woman in the Statistical Sciences. The award will be conferred on September 9, 2015. The award recipient will deliver a lecture at the UAB award ceremony and will receive all expenses, the award, and a $5,000 prize.

Eligible individuals are women who have completed their doctorate, have made extraordinary contributions and have an outstanding record of service to the statistical sciences, with an emphasis on both their own scholarship and on teaching and leadership of the field in general and of women in particular and who, if selected, are willing to deliver a lecture at the award ceremony. For additional details about the award and for details on the nomination process, please visit http://www.soph.uab.edu/awards/norwoodaward. The deadline for receipt of nominations is **June 26, 2015**; electronic submission of nominations is encouraged.

## "Women in Maths" at Facebook

Susanne Pumpluen, a mathematician at the University of Nottingham, has started a Facebook Page "Women in Maths" that seeks to encourage math women to connect with and support each other. See https://www.facebook.com/womeninmaths. If you scroll down the listings a bit, you'll see the Emmy Noether graphic used at Google on her birthday in March.

**The University of North Carolina at Greensboro, NC**, is hosting the 35th Annual Southeastern-Atlantic Regional Conference on Differential Equations (SEARCDE) during October 10-11, 2015. The primary objective of this conference is to promote research and education in the field of differential equations by bringing together established mathematicians, recent PhD recipients, and graduate students. In addition to the plenary talks by four eminent mathematicians, participants will have the opportunity to present contributed talks. Visit the website http://www.uncg.edu/mat/searcdeconf/2015/ for more details.

AWM
11240 Waples Mill Road
Suite 200
Fairfax, VA 22030

NON-PROFIT ORG.
U.S. POSTAGE
PAID
WASHINGTON, D.C.
PERMIT No. 827

Printed in the U.S.A.

ASSOCIATION FOR WOMEN IN MATHEMATICS

Volume 45, Number 3, May–June 2015

## ADDRESS CORRECTION FORM

☐ Please change my address to:
☐ Please send membership information to my colleague listed below:
☐ No forwarding address known for the individual listed below (enclose copy of label):
*(Please print)*

Name _____

Address _____

City _____ State _____ Zip _____

Country (if not U.S.) _____ E-mail Address _____

Position _____ Institution/Org. _____

Telephone: Home _____ Work _____

☐ I **DO NOT** want my AWM membership information to be released for the **Combined Membership List (CML)**.

***MAIL TO:***

AWM
11240 Waples Mill Road
Suite 200
Fairfax, VA 22030

***or E-MAIL:***

awm@awm-math.org