



ACS Newsletter

The Newsletter of the Southern Arizona Section of
the American Chemical Society

Spring/Summer 2005



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Newsletter:

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Hello from the Chair

I'm still new to southern Arizona, moving here a little over two years ago, and am still finding my way around the area. My background is mainly education, but, as an undergraduate cooperative education student at Drexel University, I worked in the food industry, papermaking, and plastics early in my career. As a result, I have maintained a passion for laboratory work with an emphasis on applications of chemistry to the everyday.

One of the major involvements of my life was with the Institute for Chemical Education (ICE) where I spent 14 summers working with teachers, teaching hands-on science in the classroom and lab, and youngsters, in summer chemistry camps. I was instrumental in starting that program here, in Tucson, at the University of Arizona in 1985. I continue to stress that science literacy is a necessity in our society and, as some of you may be aware, I have started a series of free teacher workshops at Pima Community College along with a yearly public demonstration program to further my cause.

As Chair of the Southern Arizona Section of the ACS, I believe we are here to serve you, our membership. Our functions are more social than technical and we want activities that allow you to associate with professional colleagues of all ages. But, we are, and should be, sharing our expertise with our community. We have much to offer. We need to be concerned with mentoring both undergraduate and graduate students with respect to careers, graduate school, resumes, and job interviews. There are a number of science fairs that are always looking for judges. There are teachers who would welcome a scientist in the classroom, especially if the visit involves demonstrations or hands-on activities such as the ACS Kids in Chemistry program.

As part of this newsletter, we have included a questionnaire about the Section and its activities. Tell us how we can better serve you. Tell us the kind of programs you would like us to sponsor. We would welcome anyone who would like to serve on a committee or to contribute your expertise to the Section. We know your time is valuable to you, but you also have great value to your Society and community. We don't ask for a lot of your time, but a few minutes are a great help. Please respond to the questionnaire.

- David A. Katz, April 2005



Congratulations to our 50-year members

Dr. Vernon J. Feil	Dr. John Paul Schaefer
Dr. Richard L. Hansen	Mr. Harold A. Vincent
Dr. Frank Hartdegen	Mr. Alan Keiser Williams
Dr. Charles I. Lupu	Dr. James C. Woodbrey



Biography Chair 2005 David A Katz

David A. Katz is a professor in the Department of Chemistry at Pima Community College and Science Education Demonstrator and Consultant. He was Associate Professor and Chairman of the Department of Chemistry at Cabrini College from 1993 to 1998, and Associate Professor of Chemistry at the Community College of Philadelphia from 1966 to 1993.

David received his B.Sc. in Chemistry from Drexel University in 1967 under their cooperative education program and his M.Sc. in Inorganic Chemistry from Villanova University, 1974.

David is an expert chemical demonstrator and a strong advocate of hands-on science teaching. He was one of the primary instructors in the Institute for Chemical Education (ICE) demonstration program from 1984 through 1997 initiating the program at the University of Wisconsin in 1984, University of Arizona in 1985, University of Maryland in 1986, and University of Northern Colorado in 1987.

David's primary interests are in undergraduate chemical education, science education for children, public understanding of science, the chemistry of consumer products, safety in the academic laboratory, and the history of chemistry, presenting workshops and publishing papers in these areas. He is best known for his demonstration programs and has gained international attention for his program Chemistry in the Toy Store which appeared as a feature article in the 1988 Yearbook of Science and the Future of the Encyclopedia Britannica. He has presented lectures and demonstration programs at conferences, in schools and science centers throughout the United States, in Canada, Newfoundland, England, Ireland, France, Japan, Australia, New Zealand, Egypt, Hungary, Cuba, and China. He has developed an issues-based chemistry course and a new consumer chemistry course, which will be starting at Pima Community College in the Fall 2005 semester.

Prof. Katz's teaching achievements and contributions to chemical education have been recognized by the Chemical Manufacturers Association as recipient of the 1983 National Two-Year College Chemistry Catalyst Award, and by the Middle Atlantic Region of the ACS as recipient of the 1983 E. Emmet Reid Award for outstanding chemistry teaching at a small college.

David has been a long time member of the ACS, starting as a student affiliate in Drexel University and full member since his graduation. He has served on numerous committees and offices of the Philadelphia Section, including Chairman in 1984. His involvement with National ACS includes Councilor and a number of offices and committees in the divisions of Chemical Education, Chemical Health and Safety, and Professional Relations.

Biography Chair-Elect 2006 Roger L. Caldwell

Roger L. Caldwell graduated from the University of Arizona Chemistry Department in 1966. After a year with the U.S. Food and Drug Administration he returned to the UA. He retired in 2003 as Professor of Soil, Water and Environmental Science and Director of Educational Communications and Technologies from the College of Agriculture and Life Sciences, after 37 years. Over the years he served in several administrative positions at the UA and has worked with a number of organizations; he currently serves on the Pima County Environmental Quality Advisory Council and the Pima Regional Transit Authority Technical Advisory Committee.

Questionnaire for American Chemical Society Southern Arizona Section

Dear Readers,

We would be most grateful if you would take a few minutes and complete this questionnaire to help guide us in operating the Southern Arizona Section of the ACS over the next couple of years. We have approximately 600 members and we need your advice for best serving you and for providing programs in which you have an interest. In recent years we have held 4 - 6 meetings per year, the newsletter is normally sent 3 times a year, and there are awards and educational programs for teachers and students.

1. What types of activities or events would you like to see organized by the Section? For example, meetings, field trips, newsletters, web page/email information, support for schools, students or teachers, mentoring young chemists, profiles of interesting chemistry related activities in southern Arizona, and formation of special interest groups or a speakers list.

2. What specific topics would you suggest for the activities you identified?

3. How often should section meetings be held? ☐ Monthly, ☐ Bimonthly, ☐ Quarterly

4. How many meeting areas you likely to attend in a year? _____

5. What would excite you to attend a section meeting?

6. What types of content would you like to see in the newsletter?

7. What types of content would you like to see on the section webpage?

8. How would you like to receive the newsletter? (circle your choice)

1. As an email link to a web page (please supply your email address) _____
2. Paper copy in the mail
3. Both

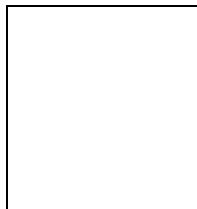
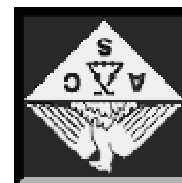
9. Do you have other suggestions for making our section more responsive to member interests?

10. May we contact you if we would like to discuss some of your responses in more detail? If yes, enter your name and email/phone number:

Please return to by March 15 to: Tom Selegue (Thomas.Selegue@pima.edu if questions), Newsletter Editor (address on reverse side)

To return: please fold this sheet in thirds so the address is clearly shown, tape it closed, and place a stamp on it.

Dr. Tom Selegue
Department of Chemistry
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Tucson, AZ 85709



An Evening of Science Fiction

The Southern Arizona section was treated to an evening of science fiction with a lecture by Connie Willis, accomplished science fiction writer on April X. Connie has won six Nebula and Six Hugo Awards (more than any other science fiction writer) and the John W. Campbell Memorial Award for her first novel, *Lincoln's Dreams*.



Mike and Amy Ray greet Ms. Willis

Her novel *Doomsday Book* won both the Nebula and Hugo Awards, and her first short-story collection, *Fire Watch*, was a New York Times Notable Book. Connie was born on December 31, 1945 in Denver, Colorado. She married physicist Courtney Willis in 1967, and has one daughter, Cordelia. They live in Greeley, Colorado.



Connie Willis delights the crowd

The chemistry of popcorn: it's all about "pop-ability"

If you took a survey of life's small annoyances, surely those unpopped kernels at the bottom of the popcorn bag would rank high on the list. But perhaps not for long.

"We think the secret to maximizing 'pop-ability' is found in the special chemistry of the corn kernel," says food chemist Bruce Hamaker, Ph.D., of Purdue University in West Lafayette, Ind. Hamaker is part of a team of scientists at the school who have identified a key crystalline structure in popcorn that appears to determine its popping quality. The finding could lead to a better microwave popcorn variety with fewer or no unpopped kernels, they say.

The study is scheduled to appear in the July 11 print version of the American Chemical Society's *BioMacromolecules*, a peer-reviewed journal, and was published in the online version of the journal April 7. ACS is the world's largest scientific society.

Besides being a nuisance, unpopped kernels, also called "old maids," can break teeth, destroy fillings and cause choking. Manufacturers have tried to reduce the number of unpopped kernels through trial and error breeding of the better performing corn kernels, but the problem persists, especially in microwave popcorn. Now, science has come to the rescue.

"Through this study, we now have a better understanding of the science behind why unpopped kernels occur and how we can use this knowledge to go about reducing their number," says Hamaker, who is director of Purdue's Whistler Center for Carbohydrate Research.

Hamaker and his associates analyzed 14 different genetic varieties of yellow popcorn and compared their microwave popping performance. Using the same experimental conditions, they determined that the number of unpopped kernels ranged from 4 percent (best) to 47 percent (worst), depending on the variety. The researchers then analyzed the properties of the better performing kernels to determine which factors contributed to their outcome.

They found that the key factor that appears to influence popping quality is the chemical structure of the pericarp, or outer hull, which is composed partly of cellulose (a polymer of glucose). During heating, the corn pericarp acts like a pressure cooker that locks moisture inside the corn kernel. The heated moisture leads to a pressure buildup until the kernel eventually ruptures and pops, essentially turning the kernel inside out and producing the fluffy white product that we eat. (Continued on page 5)

2005 High School Chemistry Olympiad

The U.S. National Olympiad (USNCO) is a multi-tiered competition designed to stimulate and promote achievement in high school chemistry. ACS local sections are vital to the success of the USNCO. They conduct local competitions to select nominees for the national exam. Local sections select their nominees by various means including: the USNCO local section exam, a locally-prepared exam, laboratory practicals, teacher recommendations, or other regional events with competitive activities among school teams.



Lycopodium

In addition to selecting nominees, the local competitions serve to encourage a large number of students to excel in chemistry by comparing their knowledge to national and international levels.



Both the local and national competitions provide a forum for interactions between students, teachers, and other chemists. Often, local sections recognize their top students with monetary or other awards.



Freebird!

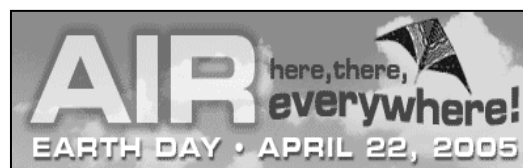


Putting the torch to some Mg in dry ice



The 2005 High School Teaching Award goes to Patricia Merha of Amphitheater High School.

An awards reception honoring Ms. Mehra, along with our 50 year members of the Southern AZ ACS section was on Thursday, April 21, 2005 at El Parador Mexican Restaurant.



On Saturday, April 16, 2005, Tucson celebrated earth day at Armory Park. The theme this year was "Air: Here, there, everywhere." The southern AZ ACS section was on hand with fun, education, and exploding chickens.



Thank you to all who participated in this successful event!

Did you know? The word *Arizona* is a Spanish version of the Pima Indian word *arizonac*, meaning "little spring place". The Aztec version is *arizuma*, meaning "silver bearing".



**Rocky Mountain Regional Meeting
Tucson, AZ
October 14-18, 2006**

Preparations for the 2006 Rocky Mountain Regional Meeting of the ACS are underway and moving quickly! As the host for the meeting the Southern Arizona Local Section is working hard to make sure that the meeting is a success. We are pleased to announce that Prof. Harry Gray, Prof. Craig Hawker, Prof. Jeanne Pemberton and Dr. Jim Wells have all agree to speak in our opening session making it a truly star studded event. We are very happy to have these distinguished scientists contributing to our meeting, and helped to set the tone for "Chemistry at the Borders".

Hosting a meeting such as this is a great deal of fun and even more work. We would like to continue our search for volunteers from the local section and from the Rocky Mountain Region as well. In particular, we are looking for volunteers to help in the recruitment and organization of the Exposition, volunteers to help plan appropriate social activities and volunteers to help us in our financial recruiting efforts. If you would like to help with one or more of these important areas, please send an email to rmacs2006@chem.arizona.edu. Also, please take a moment to visit our newly renovated web site at www.rmacs2006.arizona.edu for more meeting information. And finally, please remember that this meeting is our (the Southern Arizona Local Section) chance to shine, so let's make each other proud!

The Chemistry of Popcorn (continued)

In the best popping kernels, the pericarp is composed of a stronger, more highly ordered crystalline arrangement of the cellulose molecules than the pericarp of the poorer performing varieties, according to Hamaker and crystallographer Rengaswami Chandrasekaran, one of the team members. In laboratory studies, the researchers demonstrated that these stronger crystalline structures tend to maximize moisture retention, leading to a more complete rupture and fewer unpopped kernels.

"We believe that the amount and location of the cellulose component of the kernel are critical for crystallinity and think that this property can be transferred to corn kernels to improve their popping performance," Hamaker says. "We're not sure yet exactly how this will be achieved, but we're optimistic that enterprising researchers will be able to do this in the near future."

Possible techniques include selective breeding of those kernel varieties that best exhibit this optimal crystalline structure, chemical modification of corn kernels to produce the desired structure and even genetic engineering of the corn plant. If researchers are successful, the new microwave popcorn could be available to consumers in 3 to 5 years, Hamaker predicts.

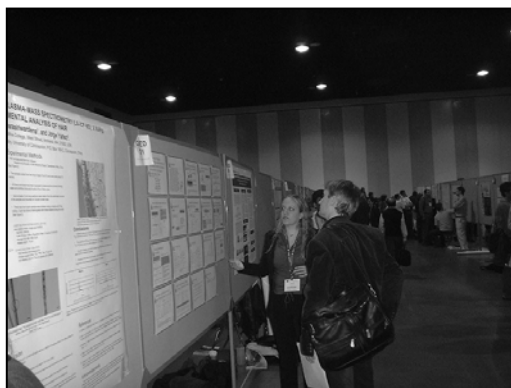
Although the new popcorn will be slightly different chemically than conventional microwave popcorn, mainly from the presence of more cellulose, it will look and taste just like any other popcorn, he says. [h1]Although this study focused on microwave popcorn, the modified kernels will likely show improvements in popping quality using hot oil and hot air popping techniques, he says.

Popcorn manufacturers have already expressed strong interest in this research, which was funded by Purdue's Whistler Center for Carbohydrate Research.

The American Chemical Society is a nonprofit organization, chartered by the U.S. Congress, with a multidisciplinary membership of more than 158,000 chemists and chemical engineers. It publishes numerous scientific journals and databases, convenes major research conferences and provides educational, science policy and career programs in chemistry. Its main offices are in Washington, D.C., and Columbus, Ohio.

— Mark T. Sampson, From the American Chemical Society website

The 117th National Meeting of the American Chemical Society San Diego, CA, March 17-21, 2005



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Upcoming Event

Mark your calendars for Thursday, September 22,
2005. An evening at the Tucson Botanical Gardens, to
include a speaker, dinner, and a tour of the grounds.

Conversion Factor of the Month
1 erg = 2.316 J

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