The Magazine for ACS Student Affiliates
Volume 16 ■ Number 2
November/December 2006

in Chemistry


AUGUSTANA COLLEGE


JUPITERIMAGES

Cover: JupiterImages, Sodium Silicate. Inset photo courtesy of Furman University.


JUPITERIMAGES

in Chemistry is available free to Student Affiliates of the American Chemical Society and the faculty advisors to Student Affiliates chapters. Student Affiliates dues: $37; for an application, call the Undergraduate Programs Office at 800-227-5558, ext. 4480. The American Chemical Society assumes no responsibility for the statements and opinions advanced by contributors. Registered names and trademarks, etc., used in this publication, even without specific indication thereof, are not to be considered unprotected by law.


COURTESY OF JUDIT CAMACHO

Mentoring and Lifelong Learning

By Judit Camacho

Thanks to a mango, I found my first mentor. It was 1995; I was an undergraduate in mathematics at University of California, Santa Cruz (UCSC). I was stressed out, overwhelmed, and on the verge of thinking that completing my degree would be impossible. During a class break, I was eating my mango, and 60-year-old Freda Hedges came up to me and asked why I was eating the fruit with the peel on.

Freda was different from anyone I had ever met. She was from Oklahoma, I was a California Mexican, and neither of us had close friends of the "other race." She had traveled many roads in her life. She had obtained her Ph.D. in psychology, taught at the University of California, Los Angeles, owned her own business and returned to school to take undergraduate courses in physics and math. She was the most enthusiastic student I had ever seen. She always sat in the front of the class and had no qualms about asking questions. I, on the other hand, usually sat toward the middle and avoided asking any questions — even though I was lost about 80 percent of the time!

From that day forward, I began to learn from Freda, submersing myself in fields beyond mathematics. I felt at home in her apartment filled with books ranging from poetry to science. She modeled whom I want to be — a seeker of knowledge and a guide to others with a similar quest. I followed her to local lectures, to organic gardens, and to the public library.

As I became friends with Freda, I also had the opportunity to work for an organization whose very spirit is mentoring. The Society for Advancement of Chicanos and Native Americans (SACNAS) is a national non-profit organization based in Santa Cruz that encourages underrepresented minority students to pursue graduate education and obtain the advanced degrees necessary for leadership roles, research careers, and science teaching professions at all levels. While Freda was helping me realize the "seeking knowledge" part of my dream, SACNAS was enabling me to fulfill the "guide to others" part. My job at SACNAS led me to work on a number of projects and special initiatives at the National Institutes of Health in Washington D.C., but after six years, the desire to teach mentoring skills to my community has brought me back to SACNAS.

At the heart of SACNAS is a mentoring community, a vast nationwide network of students and faculty. The passion of our mentors shines through, and SACNAS has won numerous acknowledgements. In May 2005, the White House awarded SACNAS the 2004 Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring, and in 2002 the National Science Board recognized SACNAS as "the premier organization that promotes diversity in science careers."

From my own experience with Freda and the mentoring relationships I have had the honor to witness at SACNAS, I know that good mentoring is often at the heart of a student's success. In the September 2006 issue of *Washington Monthly*, there is an article entitled, "Is Our Students Learning?" It notes that, "Years of study have shown that the more time and effort students spent researching papers, interacting with faculty, and studying with classmates, the more they learn, if their efforts are well-directed." I believe that mentors — faculty, peers, and others — are most often the facilitators of "well-directed" efforts. Mentors assist us in choosing or considering new careers, mapping plans, and looking out for new unimagined opportunities that can enhance our chances of reaching our goals.

Here are other ideas about mentoring that I have learned both from my friend Freda and my experience at SACNAS:

- Mentoring can be informal or formal, and academic or non-academic
- The mentor can choose the 'mentee' or vice versa
- Modeling can be the most effective type of mentoring
- We can be mentors at any academic level as well as peer-to-peer
- Mentors and mentees need not be from the same ethnic background

SACNAS and Freda solidified my belief that mentors are the key to advancing all students, especially underrepresented youth in science. I am honored to know and work with such a committed group of scientists, students, and staff who believe in the power of mentoring to help individuals learn and reach their full potential. iC

Judit Camacho is executive director of SACNAS.

Always wanted to know what other chapters are doing... but never had the opportunity to ask? SAACS Chapter Spotlight includes questions and answers designed to inform and inspire chapters, as well as their faculty advisors. We encourage you to contact the chapters and advisors below to find out more!

If your chapter and advisor would like to be featured in the SAACS Chapter Spotlight, please contact Alicia J. Chambers at 800-227-5558, ext. 6176 or e-mail a_chambers@acs.org.

Augustana College
Sioux Falls, South Dakota

Chapter president: Kelsie Betsch
Institutional environment/ composition: Small, rural, private 4-year undergraduate institution
Number of chapter members: 29
Number of ACS Student Affiliates: 29

Q What are some of the interesting ways your chapter recruits its members?
A Students' SAACS fees are paid from fund-raising events. We also keep a bulletin board filled with updated pictures from events and a scrapbook in the chemistry department office for visiting students to peruse.

Q How do you retain members from year to year?
A The chemistry department at Augustana College is a fairly small department with a family atmosphere. There is a general expectation that chemistry majors will be members of the SAACS chapter. We try to have a couple of social events each semester, including meals at faculty mentors' homes, and send e-mails to keep everyone informed about upcoming events.

Q What is the most unique activity your chapter sponsors?
A The students sponsor an instrument training night two times during the academic year, offering hands-on training for 4-5 major departmental instruments. All of the training is run by upperclassmen, and we offer all participants a free dinner.


AUGUSTANA COLLEGE

Q Does your chapter attend non-ACS meetings? How many times/year?
A We attend meetings of the South Dakota Academy of Science, Posters on the Hill (for State Legislators) and the Augustana Symposium. Each of these events occurs once per year.

Q Has your chapter presented research findings and/or chapter activities at a poster session?
A We present research findings at events sponsored by the Sioux Valley Local Section and the Northern Plains Research Center, and at the non-ACS meetings already mentioned. We also have a large attendance at the ACS Midwestern Regional Meeting and send a smaller delegation to ACS Spring National Meeting every year.

Q Does your chapter have a web page?
A Yes — our website is located at http://student.augie.edu/~acs/. The webmaster is an elected student officer.

Q What is your most successful fundraiser to date?
A Our T-shirt sale last year was very successful (Experiment with a Chemist!), as were sales of spice racks we made utilizing old wooden test tube racks and test tubes filled with spices.

Faculty Advisor
Jetty Duffy-Matzner,
1/2 year

Q Why/how did you become a faculty advisor?
A I was very active with Student Affiliates as both an undergraduate and graduate student. I became the faculty mentor shortly after accepting a position at Augustana. The students and I have worked hard to revitalize our group and I think we have been fairly successful.

Q What is your role as a faculty advisor?
A I encourage students to find activities they are interested in. We take a fair number of students to regional and national meetings, and also pay for Student Affiliate fees. I encourage and support our group in the projects that they decide to tackle. Sometimes the students need someone to help them refocus and guide them a bit, and other times they just need someone to smile at as they pass by in a parade. I try to provide the mentoring that they need.

Q What challenges have you faced in your position?
A We face the same challenges as any group of volunteers in an academic setting: turnover of students every year (especially in leadership positions), students who are overwhelmed by their schedules, motivating officers to complete their written reports by the end of the academic year, and the financial needs of a vigorous student group.

Q What has been the most rewarding aspect of your service as a faculty advisor?
A I work with some great students and we have a really active section. I get to see the personal and professional growth that these students experience by volunteering in an organization such as the ACS. They learn that a professional career should also include an expectation of service. I really enjoy watching the students develop confidence and poise through our activities. It is also extremely rewarding to experience the development of a team mentality among these very independent younger people.

Q What advice can you offer those new to the advisor position?
A Remember that the SAACS group is all about the students and the experiences that they will gain. Be a good mentor, respect your students' time constraints, and help them develop into professionals who are ready and willing to be active volunteers now and in their future careers.

DID YOU KNOW?

"A Spicy Fundraiser!" was one of the chapter articles in the April/May 2004 issue of *in Chemistry* (available at chemistry.org/education/inchemistry.html)

The University of Illinois at Urbana-Champaign

Chapter president: Timothy Mui
Institutional environment/ composition: Large, public, 4-year institution
Number of chapter members: 30
Number of ACS Student Affiliates: 8


UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Q What is your most successful recruiting event/method?

A Our most successful recruiting event is our Liquid Nitrogen Ice Cream Social. We invite students interested in joining to enjoy free ice cream (made on the spot!) and meet with other people already involved in the organization. The following weekend we invite everyone on a canoe trip, which provides an excellent, if somewhat wet, bonding experience!

Q How do you retain members from year to year?

A Our approach to member retention differs each year. Our members enjoy coming back to help tutor or mentor their peers, and many of them take leadership roles in organizing the numerous events we coordinate.

Q Does your chapter attend ACS national/regional meetings? How many times/year?

A We attend a regional meeting in the fall and the national meeting in the spring, bringing as many people as we can (typically 4–8 students). Most of these students present their research. Our chapter recently presented a poster on what students look for in an undergraduate chemistry club.

Q Does your chapter have a Web site?

A It is our main method of communication with members. Students use the site to sign up for our e-mail list, find out about our next activity, or get more information on previous meetings or events they may have missed.

Q What is your most successful fundraiser to date?

A Our chapter is known for making creative T-shirts, and we currently sell two designs to graduate students in the research labs and undergraduates outside our main chemistry lecture hall. This is a great way for students and faculty alike to show their support for the chemical sciences!

Faculty Advisors
Lauren Denofrio, 2 years and **Jesse Miller,** 1 year

Q How/why did you become a faculty advisor?

A Lauren — As an undergraduate at the University of Illinois, Urbana-Champaign, I served as our student chapter president. I felt very strongly that a large, active SAACS chapter made our department feel more like a community. As students, we really benefited from our chapter's offerings. When I became a member of the faculty here, I liked the idea of perpetuating that.

A Jesse — I had never been involved in an organization like Student Affiliates. I wasn't a traditional student, as I lived far from the University of Illinois campus while an undergraduate (and a new dad). Later in my career, I felt that I really missed out on the SAACS experience. When Lauren asked me to participate, I was very eager to become a part of this group.

Q What is your role as faculty advisor?

A We help students organize their ideas and facilitate their trips and fundraisers. We also mentor many of our active undergraduates in an informal way.

Q What challenges have you faced in your position?

A Our number-one challenge here at UIUC is recruitment. The chapter is active, but we don't get a lot of new membership each year or semester. We also operate on a small budget. We take several trips to ACS national and regional meetings each year, requiring help in addition to our own fundraising to finance activities each semester.

Q What has been the most rewarding aspect of your service as a faculty advisor?

A We both feel that the most rewarding experience in being advisors has been watching our students take ownership of this program. Another rewarding aspect is that in the past, advisors often told the students what to do to ... whereas now, the students tell **us** what it is that they need. This growth in our students is very inspiring.

Q What advice can you offer those new to the advisor position?

A Lauren — The key is realizing that progress is more important than perfection. Each semester that the program becomes more successful is a good semester! Good leadership, creative programs, and community impact don't happen quickly, and it may take a long time to establish the chapter.

A Jesse — Micromanaging students is a bad thing. Rather than come across as badgering students about taking care of program details, we've found that it's better to show them that we trust them to do so.

Questions about SAACS? Call the ACS representatives listed below.
(800-ACS-5558)

- **Internships, study abroad, careers, and graduate school**
  Adam M. Boyd, *ext. 6188*
- **Chapter and regional meeting grants, chapter retention, and recruitment**
  Alicia J. Chambers, *ext. 6176*
- **General SAACS information and chapter activation**
  Robin Y. Lindsey, *ext. 4480*

THE AMERICAN CHEMICAL SOCIETY
STUDENT AFFILIATES PROGRAM STAFF
CONGRATULATES THE

Award Winning Chapters

2005–2006

GOOD LUCK AS YOU START
A NEW YEAR OF SERVICE
TO THE COMMUNITY!

Alicia J Chambers
Andrea T. Bennett
ADAM PRD
Robin Yordy

2005-2006 ACS Student Affiliates Chapter Awards

The ACS Committee on Education selects Student Affiliates chapters to receive special recognition on the basis of their programs and activities as described in their annual reports. Awards are classified as outstanding, commendable, and honorable mention. For the 2005-2006 academic year, 34 outstanding, 58 commendable, and 75 honorable mention awards will be presented during the 233rd ACS National Meeting in Chicago, IL, on Sunday, March 25, 2007. The award-winning institutions, **chapter president(s)**, and faculty advisor(s) are listed below. Also listed are the chapters that will be recognized by the ACS Green Chemistry Institute as "green chapters" for successfully completing green chemistry activities. Please join us in congratulating these Student Affiliates chapters for a job well done!

OUTSTANDING

Barry University, Miami Shores, FL, **Heather Harricharran,** George H. Fisher

California State University-Dominguez Hills, Carson, **Cheri Glenn,** Sofia Pappatheodorou

Central Michigan University, Mount Pleasant, **Megan McCallum and Meghann Vanslager,** Sharyl Majorski and Dale LeCaptain

Ferris State University, Big Rapids, MI, **Erica Touhill and Marcy Watson,** Pasquale Di Raddo and Kelley Templin

Georgia Southern University, Statesboro, **Emily Edenfield,** Michele McGibony

Glenville State College, WV, **Brenton Drake,** Kevin Evans

Henderson State University, Arkadelphia, AR, **Jessica Herron,** Janice J. O'Donnell

Interamerican University of Puerto Rico-San Germán, **Nicole M. Moreno,** Angela Gonzalez

James Madison University, Harrisonburg, VA, **Pamela Dopart,** Kevin Minbiole and Rosa Rivera-Hainaj

Lander University, Greenwood, SC, **Alexandra Foguth,** Ralph C. Layland and Peter A. Vahjen

Mercer University, Macon, GA, **Beth Rainwater,** Nancy Carter Dopke

Northeast Texas Community College, Mount Pleasant, **Ashly Perryman,** James K. Archer

Sacred Heart University, Fairfield, CT, **Melissa Hernandez,** Linda Farber

Saint Francis University, Loretto, PA, **Paul Johns,** Nathan Malavolti

Saint Mary's College, Notre Dame, IN, **Nona Hollenbaugh,** Christopher J. Dunlap

Seton Hill University, Greensburg, PA, **Katie Donaldson,** Susan Yochum

Shippensburg University, PA, **Erica Haslach,** Christine Martey-Ochola

South Texas College, McAllen, **Graciela Carriaga,** Ludivina Avila

Texarkana College, Texarkana, **Kristin Williams,** Patricia Harman

Truman State University, Kirksville, MO, **Danielle Stacy,** Barbara Kramer

University of Arizona, Tucson, **Libby Serbi,** John Pollard

University of Detroit Mercy, MI, **Anne Labut and Bryan Vos,** Matthew J. Mio and Katherine Lanigan

University of Northern Colorado, Greeley, **Lindsay White,** Kimberly Pacheco

University of Pittsburgh, PA, **Christopher J. LaRocca and Brendan D. Keeler,** George C. Bandik

University of Puerto Rico-Aguadilla, **Yanira López,** Carlos R. Ruiz-Martínez and Rafael A. Estremera-Andújar

University of Puerto Rico-Humacao, **Tanya L. Díaz,** Juan Suárez

University of Puerto Rico-Río Piedras, **Manual Rodríguez Rivera,** Ingrid Montes

University of St. Thomas, Houston, TX, **Michael Holliday,** Thomas B. Malloy, Jr.

University of Tennessee at Martin, **Andrew R. Bernard,** S. K. Airee

University of Texas at Dallas, Richardson, **Stephanie Taylor,** John W. Sibert

University of Toledo, OH, **Andrew Stelzer,** Julie Mosher

Union University, Jackson, TN, **Rhett Barker,** Charles M. Baldwin and Randy F. Johnston

Waynesburg College, PA, **Merissa Scozio,** Robert B. LaCount

Xavier University of Louisiana, New Orleans, **Nichole T. Guillory,** Michael Adams

COMMENDABLE

Angelo State University, San Angelo, TX, **Christopher Hobbs,** Donna K. Howell

Anne Arundel Community College, Arnold, MD, **Michael Pinto,** Lynn Tracey

Augustana College, Sioux Falls, SD, **William Buchanan,** Jetty L. Duffy-Matzner

California State Polytechnic University, Pomona, **Jackie Morcos,** Charles Millner and Laurie Starkey

Carroll College, Waukesha, WI, **Cara Casper,** Michael Schuder

College of Saint Elizabeth, Morristown, NJ, **Christine Haitmanek,** Sr. Marian Jose Smith

Concordia University, St. Paul, MN, **Nathan Burrows,** David Blackburn

DePauw University, Greencastle, IN, **Samuel Rund,** David Roberts

Duquesne University, Pittsburgh, PA, **Edward Franklin,** Theodore Weismann

Eastern Oregon University, LaGrande, **Julia Deutsch,** Anna Cavinato

Elizabethtown College, PA, **Mary Harner,** Thomas E. Hagan

Elon University, NC, **Ashly Biscoe,** Paul Weller

Evergreen State College, Olympia, WA, **Felix Nau,** Dharshi Bopegedera

Florida International University–Biscayne Bay, North Miami, **Jessalyn Machado,** Milagros Delgado and Mayra Exposito

Florida Southern College, Lakeland, **Bradley West,** Carmen V. Gauthier

Georgia College and State University, Milledgeville, **Daniel Cole Brooks,** Catrena H. Lisse and Michael McGinnis

Interamerican University of Puerto Rico–Metropolitan Campus, San Juan, **Luz Mulero,** Izander Rosado-Lozada

Kennesaw State University, GA, **Gina Polimeni,** Jennifer Powers

Los Angeles City College, CA, **Sreedevi Swaminathan,** Aaron Brown

Louisiana State University at Baton Rouge, **Lisa Brown,** Paul Russo

Millikin University, Decatur, IL, **Nicole Kennedy,** George Bennett

Missouri Southern State University, Joplin, **Amber Cullum,** Melvyn Mosher

Murray State University, KY, **Valerie Spivey,** Harry Fannin

North Dakota State University, Fargo, **Dave Schultz,** Seth Rasmussen

Northeastern University, Boston, MA, **Amy Kallmerten,** Thomas Gilbert

Northwestern University, Evanston, IL, **Jessica Bulbin and Kimberly Zamor,** SonBinh T. Nguyen

Ouachita Baptist University, Arkadelphia, AR, **Jessica Baima,** Marty Perry

Santa Clara University, CA, **Janet Olsen,** Linda S. Brunauer

St. Cloud State University, MN, **Sasha Marine,** Mark Mechelke

Southern Illinois University, Edwardsville, **Nellie Shaul,** Susan Wiediger and Yun Lu

Southwest Minnesota State University, Marshall, **Kyle Henning,** Jay Brown

Suffolk University, Boston, MA, **Michelle Constante,** Doris Lewis and Angela Buffone

Texas A&M University-Kingsville, **Matthew Flores,** Thomas Hays and Rochelle Martino

Trinity University, San Antonio, TX, **Julianne Hatfield,** Adam Urbach

Tuskegee University, Tuskegee, AL, **Rozlyn Chambliss,** Barbara Rackley and Albert Russell

Union College, Schenectady, NY, **Sarah Sparks,** Mary K. Carroll

University of Arkansas at Little Rock, **Kristy Kelley,** Jerry A. Darsey and Marian Douglas

University of California-San Diego, La Jolla, **Thanh-Trang Vo,** Barbara A. Sawrey

University of Colorado at Denver, **Zinat Ismael,** Michael Travers and Susan Schelble

University of Michigan-Flint, **Andrew Doherty,** Jessica Tischler

University of New Haven, West Haven, CT, **Cheryl Brown,** Eddie Luzak and Azriel Gorski

University of Pittsburgh at Titusville, PA, **Christian Martone and David Groscost,** Ping Furlan, Diana Browning, and Cindy Andes

University of Puerto Rico-Arecibo, **Sergio J. Cardona-Gonzalez,** Ivonne I. Fernández-Martínez and Emiliano García

University of Puerto Rico-Cayey, **Jennifer Sepulveda and Viviana Orozco,** Elba Reyes

University of Puerto Rico-Mayaguez, **Desiree M. Colon Chamorro,** Sara Delgado Ortiz

University of St. Thomas, St. Paul, MN, **Melissa Jones,** Anthony J. Borgerding and Kristine Wammer

University of Tennessee at Chattanooga, **Maikel Botros,** Manuel F. Santiago

University of Texas at San Antonio, **Francisco Ruiz,** Candace M. Coyle and Mike Kurz

University of Texas at Tyler, **Luke Potts,** Neil Gray and Tanya Shtoyko

University of Wisconsin-Eau Claire, **Chris Knutson,** Kurt Wiegel and James Boulter

Westminster College, New Wilmington, PA, **Aaron Bruck,** Peter Smith and Helen Boylan

Virginia Wesleyan College, Norfolk, VA, **MariCarmen Korngiebel-Rosique,** Joyce Easter

Washington and Jefferson College, Washington, PA, **Sree Katragadda,** Thomas Stringfield and Steven Malinak

Washington College, Chestertown, MD, **Cassie Slentz,** Anne Marteel-Parrish and James R. Locker

Western Kentucky University, Bowling Green, **Abby Hobbs,** Kevin Williams

Wilkes University, Wilkes-Barre, PA, **Deana Mikhalkova,** Donald Mencer and Henry Castejon

HONORABLE MENTION

Alvernia College, Reading, PA, **Kevin Burns,** Elaine Schalck and Steven Campion

Aquinas College, Grand Rapids, MI, **Melissa Conklin,** Li-Heng Chen and Elizabeth Jensen

Appalachian State University, Boone, NC, **Brad Miler,** Carol M. Babyak and BJ Yoblinski

Arkansas State University, State University, **Jerrod Scarborough and Sheffield Kent,** Mark Draganjac

Augustana College, Rock Island, IL, **Colleen McGehee,** Mary Ellen Biggin and Sally Burgemeier

Bradley University, Peoria, IL, **Kara Williams,** Dean Campbell

Carlow University, Pittsburgh, PA, **Anjenet Noel,** David L. Gallaher

Centenary College of Louisiana, Shreveport, **Kelly Waterhouse,** Thomas M. Ticich

Central Washington University, Ellensburg, WA, **David Nguyen,** Timothy Lowell Sorey and Eric Bullock

Clarion University, Clarion, PA, **Marisa Boyer,** Cory DiCarlo and Jonathan Touster

Cornell College, Mount Vernon, IA, **Katie Brown,** Craig Teague

Delta State University, Cleveland, MS, **Michelle W. McCluskey,** Rie Somlai and Charles Smithhart

East Stroudsburg University, PA, **Brittany Fonner,** John Freeman and William Loffredo

Emory University, Atlanta, GA, **Katherine Rodby,** Tracy Morkin

Emory and Henry College, VA, **Anthony Leonard and Caci Lamb,** James Duchamp

Florida International University, Miami, **Brandon Meyers,** Konstantinos Kavallieratos and Piero Gardinali

Frostburg State University, MD, **Matthew Crawford,** Don Weser and Mary Mumper

Geneva College, Beaver Falls, PA, **Kristin Butterworth,** Melinda Stephens

Hartwick College, Oneonta, NY, **Justine Beck,** Susan M. Young

Hendrix College, Conway, AR, **Jennifer Merritt,** David Hales and Warfield Teague

Hope College, Holland, MI, **Lynn Cargill,** Jason G. Gillmore

Illinois Wesleyan University, Bloomington, IL, **Ambrose Panico,** Laura Moore and Rebecca Roesner

Indiana State University, Terre Haute, **Rebecca Coates,** Laurence Rosenhein

Juniata College, Huntingdon, PA, **Marsha Loth,** Tom Fisher and Richard Hark

Lambuth University, Jackson, TN, **Tabitha Hill,** Victoria Moeller and David Hawkes

Lebanon Valley College, Annville, PA, **Ashley Visneski,** Marc Harris and Tony Neidig

Lock Haven University of Pennsylvania, **Crystal A. Lee,** Brent May and Kevin Range

Longwood University, Farmville, VA, **Sarah Crane,** Melissa Rhoten and Lee Friedman

Manhattan College, Riverdale, NY, **James Kuehn and Mary Anne Santiago,** Pamela Kerrigan and Bro. Andrew Winka

Middle Tennessee State University, Murfreesboro, **Jerry Oxsher,** Andrienne C. Friedli and Gary D. White

Millersville University of Pennsylvania, **Jodi Meyers,** Lyman Rickard and Pat Hill

Minnesota State University, Mankato, **Rachel Burkard,** Trenton Vorlicek

Morehead State University, KY, **Tonia L. Stroud,** Mark Blankenbuehler

Newberry College, SC, **Wyatt Chocklett,** Christina McCartha

Norwalk Community College, CT, **Kellie Kravarik,** John Dolhun

Pepperdine University, Malibu, CA, **Celeste Honaker,** Douglas Mulford

Pontifical Catholic University of Puerto Rico, Ponce, **Wilfredo Marrero,** Jose R. Escabi and Carmen Collazo

Rider University, Lawrenceville, NJ, **Larisa Gofman,** Bruce Burnham

Roanoke College, Salem, VA, **William E. Wolanski,** Gail Steehler and Adele Addington

Roger Williams University, Bristol, RI, **Kerry Gilmore,** Stephen O'Shea

Rutgers, The State University of New Jersey, New Brunswick, **Kelly Chang,** John Taylor

St. John's University, Jamaica, NY, **Dorina Frasheri,** Neil D. Jespersen

St. Lawrence University, Canton, NY, **Jon French,** Samantha Glazier

St. Louis University, MO, **Jennifer Fraser,** Alexa Serfis and Brent Znosko

St. Mary's College of Maryland, St. Mary's City, **Jessica Baker,** Andrew Koch and Allan Hovland

Saint Vincent College, Latrobe, PA, **Ashley Ripple,** Matthew Fisher and Bettie A. Davis

San Francisco State University, CA, **Anvi Parikh,** Clifford Berkman

Savannah State University, GA, **Lee Jackson,** Jannie Baker and Olarongbe Olubajo

Simmons College, Boston, MA, **Marcy Keddy,** Richard Gurney

Southern Connecticut State University, New Haven, **Chris Simpson,** Greg Kowalczyk and Gerald Lesley

Southern Methodist University, Dallas, TX, **Michael Perez,** Patty Wisian-Nielson

Southern Oregon University, Ashland, **Jennifer Schlegel and Chelsea Gustafson,** Greg Miller

State University of New York at Brockport, **Patrick Kendall,** Markus M. Hoffmann

State University of New York at Geneseo, **Lindsay Sperling,** John L. Deutsch

Tarleton State University, Stephenville, TX, **Richard Sevcik,** Peter Bell and Howard Nance

Tennessee Technological University, Cookeville, **Andrea Looney,** David J. Crouse and Daniel J. Swartling

Texas State University-San Marcos, **Laura Butts,** Benjamin Martin and Gary Beall

University of Arkansas at Little Rock, **Kristy Kelley,** Jerry A. Darsey and Marian Douglas

University of California at Santa Barbara, **Theresa Reno,** Leroy Laverman and Petra van Koppen

University of Colorado-Colorado Springs, **Megan Dorris,** David J. Weiss

University of Georgia, Athens, **Ben Ham,** James Anderson

University of Houston, TX, **Minhdao Hoang,** Simon Bott

University of Idaho, Moscow, **Hilary Robbeloth,** Thomas Bitterwolf

University of Mary Hardin-Baylor, Belton, TX, **Jennifer Pietrowski,** Darrell Watson

University of Missouri-St. Louis, **Rokas Juodeska,** Michael Nichols

University of Northern Iowa, Cedar Falls, **Erin Powell,** Dawn Del Carlo

University of Notre Dame, IN, **Stephen Canham,** Kenneth Henderson

University of Texas at Austin, **Brandon Bartoskaviz,** John Stevenson

University of Wisconsin-Platteville, **Rachael Lehr,** Tim Zauche

Valdosta State University, GA, **Andrea Alsobrook,** Donna Gosnell and Jon Barnett

Virginia Commonwealth University, Richmond, **Kylee Sollien,** Everett Carpenter and Sally Hunnicutt

Virginia Polytechnic Institute and State University, Blacksburg, **Mary Spencer,** Claudia Brodkin and Gordon Yee

Western Connecticut State University, Danbury, **Chris Berchem and Brittany Serke,** Paula Secondo

Western Washington University, Bellingham, **Chad Merkel,** Christopher Daley and Gary Lampman

Williams College, Williamstown, MA, **Mary Beth Anzovino and Ashleigh Theberge,** Thomas E. Smith

Congratulations!

2005-2006 GREEN STUDENT AFFILIATES CHAPTERS

Augustana College, SD
Barry University
Evergreen State College
Ferris State University
Hendrix College
James Madison University
Millikin University
Minnesota State University, Mankato
Simmons College
Suffolk University
Union University
University of Pittsburgh
University of Puerto Rico-Río Piedras
University of Puerto Rico-Humacao
University of Tennessee at Martin
University of Toledo
Virginia Wesleyan College

Green Chemistry Institute

2006-2007 Innovative Activities Grants

For the 2006-2007 academic year, the ACS Society Committee on Education has selected 7 out of 11 Innovative Activities Grant (IAG) proposals to receive funding. The ACS Student Affiliates Program is pleased to announce the winning chapters. Listed below are the schools, **student project director(s)**, the faculty advisor(s), ***project titles,*** goals, and grant amounts. We congratulate these schools and their chapters!

Angelo State University, San Angelo, TX
Eric Hobbs, Donna Howell
Angelo State University ACS Science Bowl
Goal: To generate interest in all sciences among high school students. $250

Eastern Oregon University, LaGrande
Matthew Becaver, Anna Cavinato
Can Something So Small Make a Difference?
Goal: To host a nanotechnology workshop at the 232nd ACS National Meeting. $400

Newberry College, SC
Samuel Wyatt Chocklett, Christina McCartha
SAACS Outreach for Local Girl Scout Troops
Goal: To provide Earth Day awareness to young women through "Recycling – Chemistry Can!" Activities and assist the troops in attaining an "Eco-Action" project patch. $400

Stern College for Women – Yeshiva University, New York, NY
Grace Charles, Chaya Rapp
Careers in Chemistry
Goal: To inform science majors of the many chemistry-related careers available to them. $300

Suffolk University, Boston, MA
Jack Hamm, Doris Lewis
Politics in Science Activity Series
Goal: To generate interest in science-related political issues. $110.50

University of Toledo, Ohio
Tiffany Waller, Julie Mosher
Green Chemistry Lecture Series
Goal: To increase awareness of Green Chemistry. $200

Waynesburg College, PA
Merissa Scozio, Robert LaCount
Chemistry Outreach to Local Home Schooled Students
Goal: To give home schooled students an opportunity to partake in laboratory experiments under the instruction of SAACS members. $200

2006-2007 Community Interaction—Student Affiliates Grants

For the 2006-2007 academic year, 6 out of 8 Community Interaction-Student Affiliates (CISA) project proposals have been awarded to provide pre-college minority students with enriched hands-on science activities, while giving Student Affiliates an opportunity to enhance their skills as future teachers and mentors. Listed below are the schools, the **student project director(s)**, the faculty advisor(s), ***project titles,*** goals, and grant amounts. We congratulate these schools and their SAACS chapters for their contribution to the community!

Austin Peay University, Clarksville, TN
Deanna Hensley, Shane Peterson, Carrie Brennan
Family Fun with Science
Goal: To teach students and their parents the importance of science. $400

Barry University, Miami Shores, FL
Heana Pazos, George Fisher
Science Communication Engineering Math Education (SCEME)
Goal: To provide hands-on science activities for elementary students in the SCEME program. $400

Rutgers University at New Brunswick, NJ
Matthew Eibling, John L. Taylor
Rutgers Chemistry Society's Chemistry Connection Project
Goal: To provide local elementary students with an enriched learning experience in chemistry through demonstrations and hands-on activities. $100

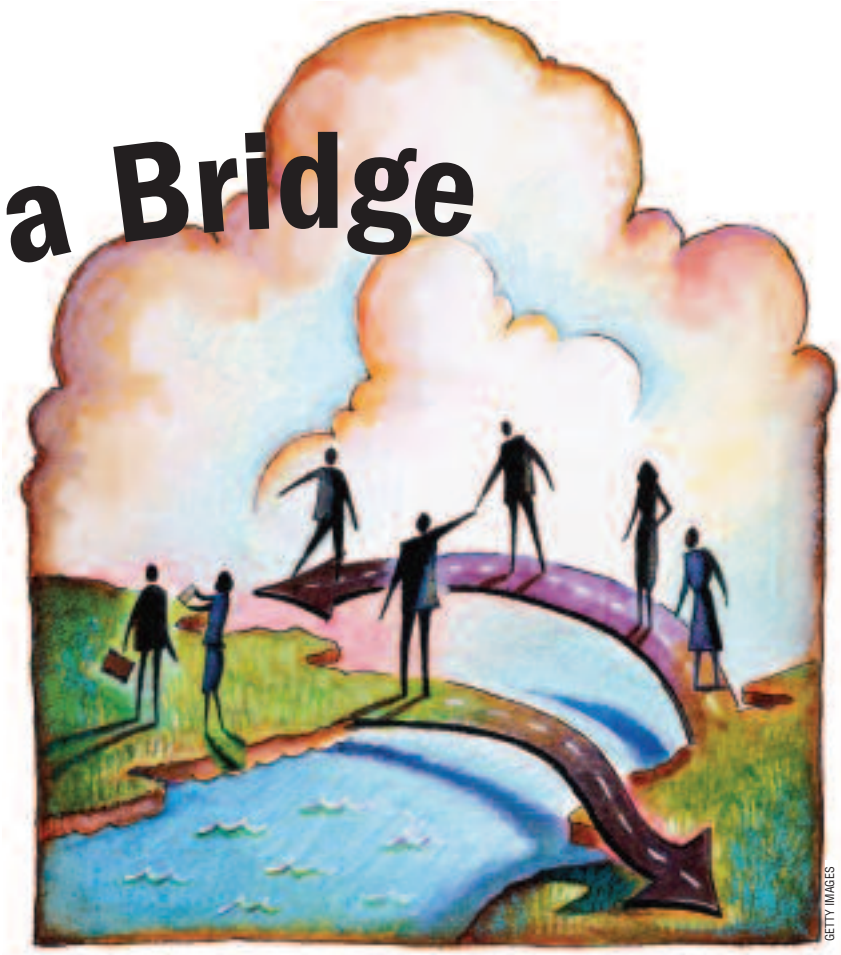
Southern Illinois University, Edwardsville
David Hermann, Susan Wiediger
Cougars Volunteering for Science
Goal: To conduct hands-on science activities in local elementary schools. $400

Union University, Jackson, TN
Kenneth Lewoczko, Jennifer Hamman, Charles M. Baldwin
Interactive Chemistry: The Classroom and Beyond!
Goal: To conduct an overnight sleepover program in which students will be able to interact with SAACS members through various demonstrations and hands-on activities. $400

University of Puerto Rico-Río Piedras
Anabel Pizarro, Ingrid Montes
ChemClubs in Puerto Rico
Goal: To organize and establish ACS-sponsored high school chemistry clubs in Puerto Rico. $150

Building a Bridge

A Symposium to Strengthen Interactions between High School and College Teachers



GETTY IMAGES

By Tony Borgerding, Melissa Jones, and Eric Fort

HOW MANY TIMES HAVE you heard general chemistry instructors complain that college students seem to be "less well prepared" for class? The number of comments about decreasing student performance seems to be growing. Introductory chemistry courses are designed to challenge and inspire future chemists, but more and more often educators see students becoming overwhelmed by the material. One can assume that instructors are maintaining the level of difficulty in their classes or even adjusting to make learning easier. Therefore, there must be other reasons for the trend.

Frustrated college professors might think that decreasing student performance is a result of the chemistry education that students receive in high school, and have been known to cry in desperation, "What are they teaching these kids?" Often their only response is a muffled echo off of the wall of journal articles inside the confines of their offices.

Noticing the frustration of both their fellow students and professors alike, the ACS Student Affiliates group at the University of St. Thomas (UST), in St. Paul, MN, accepted the challenge of answering that question in the best way possible: by getting high school teachers and college professors to meet and discuss the issue face to face.

Calling it simply, "The Chemistry Symposium," UST students have planned and orchestrated the construction of this important bridge. For two consecutive years (with a third being planned now), the Symposium has brought high school and college teachers to our campus for a Saturday meeting in late spring. These teachers mainly come from the Twin Cities metropolitan area, but a few come from colleges and high schools as far as 100 miles away. They come with a variety of goals, but among the most common are bettering their teaching environment and giving their students the best chance of success in college chemistry.

UNIVERSITY OF ST. THOMAS

Several symposium attendants gather for a picture.

We arranged the Symposium as a series of several events:

- **Welcome Breakfast and Informal Discussions.** Many participants have indicated that this is the most valuable session in the Symposium. We intentionally schedule this for one full hour so that participants can bring up special issues they would like to address. As one participant mentioned in evaluating these discussions, "It's good to know that we are all facing the same issues."
- **Small Group Discussions.** Participants are broken into groups consisting of 2-3 high school teachers, 2-3 college teachers, and 2-3

UNIVERSITY OF ST. THOMAS

University of St. Thomas SAACS members prepare to greet participants at the teaching symposium.

Giving students, high school teachers, and college teachers a chance to hear each others' perspectives on these questions in a collegial setting is extremely valuable.

students. Each group is given a list of questions that participants had sent in prior to the event. Examples include:

- "What skills/knowledge are students lacking when entering into college?"
- "What connections can give students a greater chance of success in college chemistry? According to students and college teachers, what are high school teachers doing right and what are they doing wrong?"
- "Are AP classes providing enough students with the opportunity of upper level course experience? Is it in the best interest of students to use AP credit to test out of college chemistry classes?"
- "How can we best deal with parental zeal and possibly use it to our advantage?"
- "What could collaboration with local colleges/universities do to address various needs? What do high schools need from colleges? What do colleges need from high schools in order to accommodate these needs? What examples of useful college-high school collaboration have you heard about or experienced?"

Giving students, high school teachers, and college teachers a chance to hear each others' perspectives on these questions in a collegial setting is extremely valuable. As one participant noted, "The discussions are useful, rather than gripe sessions." A range of comments reflects what participants learned about high school courses and curricula, parental attitudes, and more. One participant, wanting additional perspectives, said, "We need to get high school administrators and parents here!"

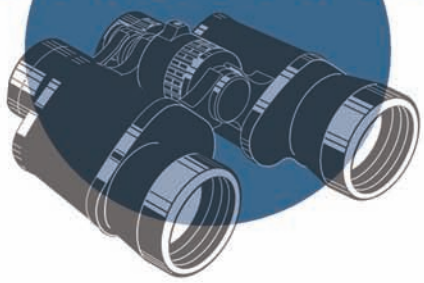
- **Whole Group Discussions.** In order to be efficient, meetings of the whole group are generally short (no more than 30 minutes) and have included:
  - Summary statements from each of the small groups
  - Panel discussions with representatives from each group
  - Presentations on educational research
  - Announcements of opportunities for instructors from ACS representatives
  - Sharing demonstrations that work in the classroom
- **Lunch and Additional Informal Discussions.** This portion of the Symposium gives participants a last chance to connect with colleagues. As with the breakfast, it is offered free of charge to all participants. Contact information and supplementary materials are provided so that participants can continue to communicate their successes, challenges, and ideas with each other.

All of the costs of the Symposium are covered by the UST Student Affiliates group. We have been fortunate to receive grants from a local college association and from UST Student Government, which we subsidize with money generated through our annual fundraising events. We also are applying for an Innovative Activities Grant from the ACS Student Affiliates Program in the coming year.

While this event is still in its early stages, we think it will continue to be valuable to college and high school teachers and thus, indirectly to students. We're excited about the new possibilities that may come from the connections we have begun to make. It's an ongoing process, however, and we're committed to continuing the dialog. iC

Tony Borgerding is an associate professor of chemistry and SAACS faculty advisor at the University of St. Thomas. **Melissa Jones** was president of the UST Student Affiliates group in 2005-2006. She graduated with a B.S. in chemistry in May 2006 and is currently working as an environmental activist for The Fund for Public Interest Research. **Eric Fort** was treasurer of the UST Student Affiliates group in 2004-2005, and the key person behind the creation of the Symposium. He graduated with a B.S. in chemistry in 2005 and is currently a graduate student at Boston College.

LOOKING FOR CHAPTER ACTIVITY IDEAS?



COMPILED BY ROBIN Y. LINDSEY

ACS Student Affiliates chapters across the U.S. and Puerto Rico are engaged in exciting, innovative, and educational activities. In order to give all chapters the opportunity to expand their activities, we will continue to highlight chapters and their work as reported in the chapter reports. Submit your report with a good description of your activities, and your chapter's activity just might appear in a future issue of in Chemistry. If you have questions about any of the activities listed below or would like further information on how to implement them, please contact the SAACS chapter directly. Good luck!

Department/College Service

Central Michigan University, Mount Pleasant, MI

The SAACS chapter at Central Michigan University held an activity at "CMU and You Day."

How long did it take to plan the activity and what was involved?
This activity took little time to plan since it has been an ongoing activity. The university sets up the event and all we had to do was plan which demonstrations to perform and set up a schedule for people doing the work. Most of the set-up was done the night before the event. We also needed a clean-up crew.

What planning resources did you use?
We referred to past demonstrations for suggestions and went to the chemistry stockroom for assistance in gathering the supplies. We are fortunate to have excellent stockroom assistance with all of our demos – from planning through waste disposal.

How many SA participated?
There were approximately 20 students who participated. Some helped gather items, some setup, while others participated at the event and helped with clean-up.

How many people attended the event?
"CMU and You Day" drew over 1,000 potential students.

What was the age range of the audience?
The audience consisted of potential CMU students (mostly high school students) and their families.

How long did it last?
The event was held from 9:00 a.m. to 12:00 noon.

What safety equipment was required?
Goggles were used.

For more information, contact Sharyl Majorski, faculty advisor, major1sa@cmich.edu.

Community Service

Furman University, Greenville, SC

Furman University SAACS members held demonstrations at the annual "May Day Play Day" event for students and special needs adults.

How long did it take to plan the activity and what was involved?
The only planning that was involved with this activity was finding experiments that would be safe and fun, obtaining the materials that we needed, and running through each demonstration prior to the event. Furman University sponsors this event annually and other students and staff who are in charge of the event organized all of the major details.

What planning resources did you use?
Our faculty advisor has done several demonstrations for a science camp, which is held at Furman every summer, so he had some great ideas for experiments. We also searched the Internet to find some hands-on activities.

How many SA participated?
Four Student Affiliates and four additional chapter members helped perform the demonstrations.

How many people attended the event?
Approximately 100 people.

What was the age range of the audience?
The children ranged from 4 to 10 years old.

How long did it last?
The event lasted all day, while our booth ran continuously for about two hours.

What safety equipment was required?
All demonstrators wore lab coats and goggles. We made sure to choose relatively safe experiments to minimize the risk of injuries.

For more information, contact Jeff Petty, faculty advisor, jeff.petty@furman.edu.

University of Mary Washington, Fredericksburg, VA

The SAACS Chapter at the University of Mary Washington held a "Magic Show" during Family Science Weekend.

How long did it take to plan the activity and what was involved?
We generally have one organizational meeting to determine which student is performing which "magic show tricks,"

one meeting to prepare chemicals and solutions, and one meeting to practice. It took approximately three hours to plan this activity.

What planning resources did you use?
We have a pile of recipes for our favorite "tricks." Students may find others tricks on the Web as well.

How many SA participated?
There were six Student Affiliates magicians.

How many people attended the event?
The event is part of our Family Science Weekend activities. There were two showings with approximately 80 to 100 in attendance.

What was the age range of the audience?
The audience ranges in age from 2 to 72 years old (or more!)

How long did it last?
Each showing was approximately 45 minutes.

What safety equipment was required?
Goggles were used. There was a fire extinguisher on hand for any flammable reactions (e.g. hydrogen balloons).

For more information, contact Leanna C. Giancarlo, faculty advisor, lgiancar@umw.edu.

Social Functions

Morgan State University, Baltimore, MD

SAACS members at Morgan State University held a "Graduating Seniors Picnic."

How long did it take to plan the activity and what was involved?
The planning took approximately 4–6 weeks. The amount and the type of foods and location had to be planned very thoroughly.

What planning resources did you use?
We utilized local partnerships with food vendors and coordinated with the housekeeping department to secure a location for the event.

How many SA participated?
Four Student Affiliates participated, planning and attending the picnic.

How many people attended the event?
30 people attended.

What was the age range of the audience?
The age of the audience ranged from 2 to 60 years old.

How long did it last?
The event lasted approximately two hours.

What safety equipment was required?
No safety equipment was required.

For more information, contact Louise Hellwig, faculty advisor, lhellwig@morgan.edu.

If you'd like your chapter activity to be included here, e-mail saprogram@acs.org

Green Chemistry

University of Puerto Rico-Rió Piedras Campus, San Juan

SAACS members held a workshop at University of Puerto Rico-Rió Piedras about using "Green Chemistry in Your Everyday Life."

How long did it take to plan the activity and what was involved?
The activity was planned two months before the actual date of the event. The planning involved deciding which demonstrations were better suited for our selected topic and audience, as well as research in the area that we were presenting to the students.

What planning resources did you use?
We used chapter board meetings, extensive consults with our Student Affiliates as well as our advisor, and literature searches for more information.

How many SA participated?
In the planning, at least 20 people were involved. Four Student Affiliates carried out the demonstrations.

How many people attended the event?
Approximately 50 people attended. Faculty and school personnel were also present.

What was the age range of the audience?
The audience was between 12 to 16 years old.

How long did it last?
The demonstration lasted about an hour and a half.

What safety equipment was required?
Safety goggles and lab coats were worn. Even though we were working with safe chemicals, which presented no hazard to our environment, we used waste disposal containers.

For more information, contact Ingrid Montes, faculty advisor, imontes@uprrp.edu. IC

Learn more about what other SAACS chapters are doing! Visit the websites listed at chemistry.org/education/saprogram.html

Robin Y. Lindsey is a lead program assistant in the ACS Education Division.

JUPITERIMAGES.COM

Researching Career Alternatives

By Allison Byrum Proffitt

YOU KNOW THEY'RE OUT THERE: EXCITING CAREERS IN CHEMISTRY OUTSIDE OF THE TRADITIONAL academia and industry routes. But how do you know which, if any, of these career paths are for you? How would you even get started?

Chemistry serves as the foundation for some of the coolest jobs around — jobs that require a passion for learning new things, for educating the public, and for being at the forefront of what's new.

For many chemists, non-traditional careers represent the best of all worlds — some of their favorite aspects of working in the lab mixed with new and different duties, work environments, or goals. A non-trادititional career might be the chance to combine a love for teaching with chemistry, or a passion for research with public service. In each case, the chemist is able to combine her or his strengths from both inside and outside of the lab.

Non-traditional careers can also offer some flexibility in educational requirements and experience. Some non-traditional careers require only a bachelor's degree, while others call for graduate work. Still other options benefit from additional graduate work in another field.

The same flexibility applies to work experience. Some non-traditional chemistry careers are enhanced by previous laboratory experience, while other employers and fields depend on on-the-job training. In many instances, your chances of entering such careers are improved by work and volunteer experiences outside of chemistry. Each of these careers, though, depends on a strong chemistry background.

In this issue, we look at four non-traditional careers for chemists — science writer, forensic chemist, patent examiner, and museum scientist — and talk with chemists who do these jobs about what they love about their careers. All of them told us that their chosen professions feature aspects that they enjoyed about chemistry and the lab, and pair those features with challenging new skills.

For many undergraduates, this combination of options is both intriguing and challenging. How do you know which of all of the options would be a good fit for you?

As you read through the career profiles, look for details about the work environments and the additional skills required for each job. Pay attention to the similarities and differences that the chemists notice between their current work and a lab setting. Imagine yourself in their day-to-day routines, and then ask yourself whether these sound like jobs that you would enjoy.

These four professionals also gave us insights into how undergraduates can learn about non-traditional careers and what steps you can take immediately to prepare yourself to enter these professions.

There's much that you can do right now to learn about options for tomorrow. Refer to the "Top 3 Things to Do Now" in each article, and begin researching careers that interest you. Using each career profile as a starting point, list the questions you have about a job and follow up with a professional chemist to get answers.

Researching different careers is the only way to really know what your options are. Learning about careers that interest you now allows you to start gathering the skills and experiences that you'll need to be successful and competitive in your job search. There are many career opportunities for chemists — the trick is finding the right combination of skills and responsibilities for you.

Chemical Careers in Brief

This collection of two- or four-page briefs provides an overview of 30 different career areas. Each brief includes:

- An overview of the career
- Places of employment
- Educational requirements
- Employment outlook
- Salary range
- And more...

Access free copies by visiting www.chemistry.org/vc2/3wk/wk3.html

Sample paper copies can be requested at epic@acs.org. A full set of paper copies can be ordered at the ACS online store (Product CLC36A).

The briefs were originally funded by the Alfred P. Sloan Foundation as part of the Sloan Career Cornerstone Series.

The career profiles on the following four pages were compiled by Allison Byrum Proffitt.

Allison Byrum Proffitt is a freelance writer in Cambridge, MA.

Science Writer Sue Morrissey

Unveiling the stories of science

"INSTEAD OF INFORMING GOVERNment about what science was doing, [I ended up] informing science about what the government was doing," says Sue Morrissey, a writer for *Chemical & Engineering News* (C&EN). This shift was the most recent step in Morrissey's transition between bench chemist and science writer.

When Morrissey was finishing her Ph.D. in biophysical chemistry, she knew she didn't want to be a lab chemist in industry and that she wasn't interested in academia, so she started looking elsewhere for a career. "I found that I had a strong leaning toward getting information out about what chemistry is," she says, and "I'd always been interested in government and science policy."

Playing off of her interests, Morrissey learned more about the field of science writing. Science writers thrive on conveying information to their readers, whether they be the public or the scientific community itself, and Morrissey soon found herself writing for the chemical community about the government and science policy.

"I write stories about chemistry, chemical engineering, and government," she says. "I look at the National Institutes of Health, the National Science Foundation, the National Institute of Standards and Technology, and NASA. I follow newspapers, press releases, agency websites, and Congressional hearings. I look at how their policies are changing and how those changes affect grants and funding."

Different Stories, Deadlines

For Morrissey, C&EN's weekly publication date lets her have some freedom in the types of stories she writes. A Congressional hearing that is breaking news can be written up in a short news brief for publication that week, while stories that look at policy trends can be crafted over several weeks.

Even with that freedom, a weekly publication still means strict deadlines. "There's not a lot of room for extensions," Morrissey says. "You can't have a blank hole when you publish. It's a hard deadline, everyone's on a fast pace, and things must get done."

The types of stories Morrissey writes are generally up to her and, in many ways, her writing is dependent on listening. "You have to learn to listen well," Morrissey says, and "you have to learn when and when not to repeat things. The social interaction [in writing] is exciting and you may not get to do that as much in a lab. You're always hearing about what's on the frontier of science in general — what's the breaking science and what's on the cutting edge of policy."

Even if her day-to-day work is dramatically different from that in a lab, Morrissey stills sees similarities between laboratory science and writing. Both require an inquisitive nature.

"In a lot of ways doing interviews is like setting up experiments," she says. "You don't know exactly what you'll get from the interview, so you need to be prepared and thorough." Like lab work, writing requires self-motivation and persistence. "I'm finding my own stories and I'm driving myself," Morrissey says.

Connecting with Chemists

Morrissey also spends time staying connected to the chemical community. "I go to conferences and interact with people in the lab and still get to be part of that excitement," she says. "I seem to align myself more with the chemical community rather than the writing community," she says. And she admits that having a Ph.D. in chemistry definitely helps her as a writer. "It is like having that secret handshake. It really makes a difference when you're talking to academics for them to know they're talking to a Ph.D."

For chemistry students who are interested in writing, Morrissey believes the best advice is to start practicing. Start locally with the chemistry department's newsletter or the campus newspaper. "I don't ever recall seeing an article [in the campus newspaper] about what the chemistry labs are doing," she says. "Try writing and interviewing people. Talk about what research is being done and how the school is benefiting from it."

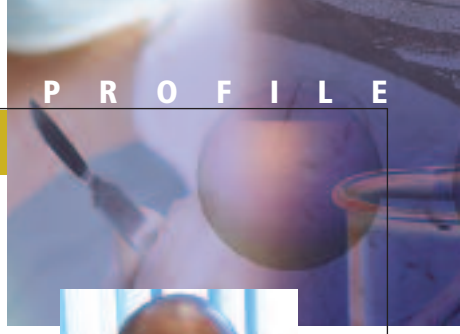
Once you get your feet wet, Morrissey suggests that you start moving up. Volunteer to write a column for your local newspaper or your ACS local section. "All of these [outlets] are great for letting you write something small and practice interviewing." Morrissey also suggests taking journalism or writing courses if your research advisor will allow it.

More than anything, she encourages would-be writers to read. "Read C&EN; read *Newsweek*. Continue to read publications and read other writers and get a feel for their styles." Morrissey credits reading other writers' work with much of her own writing education.

Morrissey found science writing by branching out a bit from the more traditional Ph.D. path, and she encourages chemistry students to investigate all of their options. "Don't be afraid to try something new. If you're not going to be happy in academia or industry, don't stay," she says. "Don't be afraid to talk to people and ask questions! You'll be surprised at how quickly you'll find a mentor that way. Just get up the courage." iC

Top 3 Things to Do Now

1. Read science writing and news writing and notice how good writing is done.
2. Offer to write an e-newsletter for your Student Affiliates Chapter.
3. Call or e-mail a science writer whose work you enjoy and ask to speak about his or her career.



Forensic Chemist Rashad Sims

Crime-solving research

FORENSIC CHEMISTS ARE EVERYWHERE IN Hollywood now — or at least, actors who portray them. But far removed from the sets and scripts, real forensic chemists also have exciting jobs. "It's a rewarding career," says Rashad Sims, a chemist working for the U.S. Drug Enforcement Administration (DEA). "I've enjoyed every minute."

Sims does not spend a lot of time watching his counterparts on television, but after nine years of working as a forensic chemist, he's well acquainted with the drama that can accompany working in a crime lab.

Sims works in one of the DEA's nine crime labs across the country, focusing mainly on identifying controlled substances. In addition to the nine crime labs, the DEA also runs seven field labs, test and research labs, and digital evidence labs.

Law enforcement agents depend on forensic chemists to provide thorough analysis of scientific evidence. When agents find material that they suspect is a controlled substance, they send a sample to the DEA crime lab. There, forensic chemists analyze, identify, and report on the samples to the agents.

A Variety of Duties

Although government crime labs tend to be structured and very professional environments, forensic chemists' days vary. "The majority of the time you're in your lab," Sims says. "But you could go testify in court, or assist a [DEA] agent in the field." Sims and other forensic chemists are sometimes called to investigate clandestine labs discovered by agents — concealed labs that were manufacturing methamphetamines, ecstasy, or other drugs. The different aspects of his job make it exciting, Sims says.

Preparing for a career as a forensic chemist has specific educational requirements. Although some forensic chemists at DEA have upper level chemistry training, the minimum requirements include a bachelor's of science degree, 30 hours of chemistry, six hours of physics, and several hours of math. Biological chemistry and forensic science training can help as well.

Besides the academic requirements, government forensic chemists must undergo a full background check and security clearance before beginning work. Working in a government lab requires discretion, and the specifics of a forensic chemists' work are confidential. All candidates, including candidates for internships, are screened for any criminal record or history of drug use.

A strong chemistry background and a clear background check aren't the only preparation you need for a career in forensic chemistry. Particularly true at DEA, forensic chemistry is a field that includes extensive on-the-job training. "You get rigorous training your first six to nine months," says Sims; he has learned many of his skills while at DEA.

The rigorous work requirements pay off. "Many folks stay with DEA," Sims says. "Their careers advance through to management and lab supervisory roles."

Finding Experience

As with all careers, some experience certainly helps, and Sims has several suggestions for students who think they may be interested in forensic chemistry. "Exposure is the main key," he says. Sims suggests starting to find ways to get some forensic laboratory experience.

The DEA has a Student Career Experience Program designed to let students get an 'up close and personal' view of life in a crime lab. Each of the DEA's nine labs has at least one such position. The labs generally develop relationships with local universities that suggest student candidates for the positions.

There are also opportunities on more local levels. City and state governments run crime labs, and many offer internships or opportunities to shadow local law enforcement officers. Some internships won't be advertised, but are still available to interested students who seek them out.

If you aren't able to set up any formal experiential learning programs, Sims suggests that you contact a forensic chemist and set up an informational interview to discuss his or her job. "Most people are excited to talk about their work," he says, and many chemists would be happy to spend a few minutes of their time discussing what they enjoy about their careers, what skills they use daily, and how they became involved in their jobs.

Sims encourages students to investigate forensic chemistry. "It's a rewarding career," he says, adding that working with the DEA and doing forensic chemistry is important to society and law enforcement. "It's a career that makes a difference." IC

Top 3 Things to Do Now

1. Visit www.dea.gov and follow the employment links to read about internships, job opportunities, and curriculum requirements.
2. If there's a DEA crime lab near you, research the Student Career Experience Program.
3. If not, contact your city's crime lab and ask about internships for chemistry students or shadowing programs.

Patent Examiner Lore Ramillano

Checking out the newest inventions

HAVING THE INSIDE SCOOP, KNOWING what's next in everyday products, seeing chemical advances down the road: perspectives like these are generally rare, but they're common at the U.S. Patent and Trademark Office, or USPTO. Patent examiners have front row seats to the action, and they play a crucial role in advancing technologies.

Lore Ramillano has been a patent examiner for a year. After earning her bachelor's degree in chemistry, she spent several years working in industry – in medical devices and cosmetic chemistry labs – but realized that something was missing in her work. When a supervisor mentioned patent law, she was immediately intrigued.

USPTO hires patent examiners and trademark attorneys to review patent and trademark applications. Generally, trademark examiners hold law degrees and have passed the bar exam. Patent examiners can come from more varied backgrounds: many, like Ramillano, have undergraduate or graduate degrees in the sciences.

Based on her chemistry degree, Ramillano was placed in an art unit, or working group, that examines patent applications related to analytical and physical chemistry. Her unit includes examiners with bachelor's, Ph.D., and law degrees.

Romillano notes, "At my present grade and experience level, I am able to make an initial assessment on an application. Though final review and signature must be performed by my supervisor and/or primary examiner, in a few years I will be able to take a certification exam and complete a signatory review program, which will allow me to have full signatory authority on all of my work."

Processing Applications

A wide range of applications are submitted to USPTO by investigators on their own behalf or with the help of a licensed intellectual property practitioner, whether agent or attorney. The assigned patent examiner works to ensure that an application meets the legal and technical criteria for granting a patent.

"I spend a lot of time at a computer searching the databases and I do a lot of reading," Ramillano explains. "The kind of applications that I have to examine can range from chemical assays to oil drilling analyzers."

Most of a patent examiners' work is research – studying the history of an invention, looking for similar inventions, and reading about how exactly an invention works. An examiner, depending on negotiating authority, may sometimes contact the applicant or applicant's representative for more details or clarification about the invention.

Because the work is mostly research-based, Ramillano sets her own day-to-day work schedule. During every biweekly period, she is responsible for submitting a certain number of reviewed applications to her supervisor. Her supervisor can sign off on her findings, or send them back to Ramillano for further research.

While the structure of the job is very different from a lab, Lore still feels closely tied to the chemical community. "The general chemical principles and how chemistry works still apply here," says Ramillano, so examiners need to understand the foundations of chemistry. "[Patent applications] are always addressing some area of chemistry and trying to improve upon it."

Getting a sneak peak of such improvements is exciting for a chemist. "Every application is giving me an idea of how chemistry is going to evolve, and what kind of chemical related products might be used by the public or used by companies later on," she says.

Success Factors

Succeeding in patent examining requires more than just a passion for what's new, and in general Ramillano feels that lab work may not be the best preparation for this career. "It's definitely possible to move into an examiner position straight from an undergraduate program," she says. "However, the transition from a laboratory-intensive environment, where you mostly use your hands and instrumentation, might be [hard]."

In Ramillano's opinion, if a student is interested in patent law, the best skills to develop are research and writing skills. Being able to learn how to search databases and how to be a very efficient and organized employee [is crucial.] You have to know how to work efficiently with your time because you have a deadline every two weeks," Ramillano explains.

Students who think they may be interested in the patent office or patent law can investigate professional organizations and talk to patent professionals there. The ACS Chemistry and the Law Division hosts events at national and regional meetings, and the American Intellectual Property Law Association offers student memberships.

There are also opportunities for hands-on work. The USPTO has summer internships available, and chemical companies sometimes offer internships or shadowing programs in their legal departments with patent attorneys, giving students a view of the other side of the process.

Even thought it's a quite a change from the chemistry lab where she started, Ramillano is quite pleased with her transition into patent law. "This job is a never-ending learning experience," she says. IC

Top 3 Things to Do Now

1. Visit www.uspto.gov for more information about patent opportunities.
2. Attend a Chemistry and the Law Division event or set up a time to talk with a division member about his or her work.
3. Participate in shadowing programs or internships at local chemical industries to gain insight into the submissions side of patents.

Museum Scientist Ed Finkel

Facilitating discoveries every day

FOUR HUNDRED E-MAILS. THAT'S ABOUT HOW much correspondence Ed Finkel finds in his inbox on a daily basis, and it sums up one of the most important aspects of his job: communication.

Finkel is a museum scientist at the Fern Bank Science Center in Atlanta, Georgia. For the past 22 years, he's used his chemistry background to educate the public about a wide range of science topics. From his first passion, chemistry, to forestry, environmental science, seismology, and beyond, Finkel loves the wide range of topics available.

Both science centers and science museums work to connect the public with science, but Finkel explains that the two types of institutions differ in their priorities. Science museums focus first on maintaining their collections and research, while science centers spend the most resources on communication and the public's education.

At the Fern Bank Science Center, scientists teach visitors about all the available resources and run the Center's extensive education programs. Fern Bank offers advanced courses for local high school students in about 20 fields including AP chemistry, advanced chemistry, biology, and ecology. The Center's 65-acre forest welcomes school groups and serves as a living laboratory for research on tree respiration in urban environments and atmospheric sampling. Traveling exhibits planned and designed by Fern Bank scientists tour area schools.

Academic Requirements

In order to succeed at a science center, you need to have a strong scientific background, Finkel says. Half of Fern Bank's instructors have Ph.D.s and the other half include ecologists and foresters. Of the chemists, two have Ph.D.s and the third has a master's degree.

But working at a science center requires more than just knowledge about one area of science. "It's fine to be specialized," Finkel says, citing his own Ph.D. in chemistry, "but you have to want to learn about the other sciences. I knew nothing about botany," Finkel says, for example, "but I had the chance to observe a botany lab [at the Center] and I just learned."

The chance to constantly learn new things about different areas of science is one of Finkel's favorite things about working in a science center, but getting to pass that knowledge on to the public is at the heart of a science center's mission. Being able to communicate and work well with people is crucial for a museum scientist.

Fern Bank attracts a wide range of patrons. "In a museum or science center you see people of every age," says Finkel. "You see science-aware parents with their eight-month-old in the stroller and they're reading the [exhibit] labels to them. We see groups of kindergarten kids that come [to walk] through the forest and the question they ask is, 'Will we see any tigers?'"

In addition to children, college students and adults take courses at the Center, local schoolteachers come for inservice and curriculum training, and senior groups explore the planetarium. "I find it fascinating to see who will come around the corner and I follow them to see what they're doing in our exhibit hall," Finkel says.

Looking for Candidates

Because of the Center's many patrons, experience working with the public, especially children, is high on the list of qualifications Finkel looks for in job candidates. "Almost any kind of experience counts — camp groups, church groups, internships," Finkel says. He also looks for public speaking and writing skills. "You have to be able to speak on your feet and answer questions and feel very comfortable with it."

Finkel feels that presentation and written communication skills often aren't developed fully in physical scientists. However, there are many ways for undergraduates to get the kind of experience Finkel looks for.

Visit a local science center or museum and volunteer. It's the best way to get experience working with children and the public, and to find out if working in a science center or museum is a good fit for you. Fern Bank regularly needs volunteers for summer camps, other programs for large groups of school children, and the Center's annual Chemistry Day.

Finkel reminds students to look within their universities and colleges as well. "A lot of colleges and chemistry departments have traveling exhibits that visit local schools," Finkel says. He encourages potential museum scientists to continue looking for teaching opportunities in graduate school as well. "Sometimes a [teaching assistant] will have a chance to do a lecture when the professor is out. [That situation] was my first real teaching experience."

Like any career based in communication, museum science requires passion and practice, both for science and for reaching the public. Having access to a wide range of scientific disciplines is a unique advantage to working in a science center or science museum, but for Finkel, communication is still the strongest selling point. After his first teaching experience in graduate school, Finkel was sold. "It was one of the most exciting experiences of my life." iC

Top 3 Things to Do Now

1. Visit a local science center or museum and volunteer.
2. Hone your teaching and presenting skills by arranging for your Student Affiliates Chapter to present at local schools.
3. Seek out other opportunities to work with the public, especially school children, and develop your leadership skills.

From Robin Arnette, *Chemical Connections*, ScienceCareers.org, 19 May 2006
(http://sciencecareers.sciencemag.org/career_development/previous_issues/articles/2006_05_19/chemical_connections/). Reprinted with permission from AAAS.

UNITED STATES: Chemical Connections

JUPITERIMAGES

By Robin Arnette

INDUSTRY OFFERS OPPORTUNITIES FOR SCIENtists with the right combination of hard and soft skills.

When Rolanda Johnson finished her Ph.D. in organic chemistry in 2003 at Louisiana State University, she intended to find a job in industry that would use her expertise. But her job search, which she started 6 months before defending her thesis, was disheartening: There was intense competition for every position she applied for, and at first she received no offers.

Johnson's experience isn't unusual. Employment in the U.S. chemical industry has been sliding in recent years. Only in certain key sectors, especially pharmaceuticals, are opportunities abundant, and even there, hiring is very competitive. In a competitive job market, knowing where and how to look can make the difference between a real job with a real salary and another 2-year postdoc waiting for real life to begin. In Johnson's case, it was networking that eventually made the difference.

High salaries, tough competition

Every 5 years, the American Chemical Society (ACS) surveys its members about their employment status, and the results are published in *Chemical & Engineering News*. In 2005, the private sector employed 62% of all the chemists and 53.4% of the Ph.D.-level chemists who replied to the survey. Salaries for industrial chemists are high compared to other sectors, the survey showed: The median base salary for chemists in industry was $90,000, compared to $64,000 for chemists in academia.

But higher salaries don't help much if you can't get a job, and private-sector employment is declining as a share of the chemistry employment market, the survey found. In just the past 5 years, the percentage of chemists working in the private sector fell by 2.7%. The unemployment rate, at 3.9%, is also relatively high among chemists whose last job was in industry; 1.6% of academic chemists and 1.4% of government chemists are unemployed.

The industry's one employment bright spot is pharmaceuticals. The percentage of chemists employed in "pharmaceutical

INDUSTRIAL SALARIES

$ THOUSANDS	BACHELOR'S	MASTER'S	PH.D.
BY WORK FUNCTION			
Analytical services	$55.8	$71.0	$93.0
Applied research	65.0	77.7	98.9
Basic research	58.7	75.8	100.4
Chemical information	68.9	77.1	94.9
Computers	75.0	86.8	100.0
General management	85.0	101.0	125.0
Health & safety	72.2	85.5	105.0
Marketing & sales	78.9	86.8	100.9
Patents	—	—	120.0
Production/QC	60.1	75.2	97.0
R&D management	95.0	103.0	130.2
BY SIZE OF EMPLOYER			
Fewer than 50	62.0	72.0	92.0
50 to 99	57.0	73.5	96.0
100 to 499	60.0	75.0	97.4
500 to 2,499	63.3	80.0	102.0
2,500 to 9,999	67.7	80.0	102.0
10,000 to 24,999	70.0	82.0	103.0
25,000 or more	72.8	83.6	110.0

NOTE: As of March 1, 2005. **SOURCE:** ChemCensus 2005

"Employment & Salary Survey" **Chemical & Engineering News**, August 1, 2005.

and related manufacturing" rose from 12.0% in 1985 to 21.6% in 2005. Chemists who do interdisciplinary work related to medicine, polymers, and materials science are also finding plenty of opportunities.

Thinking back to her job hunt, Johnson recalls that "when I was applying for positions, there just weren't that many advertised in industry for organic chemists. There were, however, lots of jobs posted for analytical chemists." The ACS survey bears this out: Analytical chemistry is the leading specialty in the chemical industry, with 17.1% of the jobs, followed by medicinal/pharmaceutical chemistry (10.9%), organic chemistry (10.8%), chemical education (7.3%), and polymer chemistry (7.3%).

Even at a particular company, hiring trends can change rapidly, however. Genentech employs many analytical chemists, synthetic organic chemists, and scale-up chemists. But, says Michael Varney, head of the small molecule drug discovery group at Genentech, those hiring trends are about to change: "For us, over the next 3 years, we'll hire more medicinal chemists and more process and scale-up chemists than we will analytical chemists."

What employers look for

In this highly competitive environment, employers can afford to be choosy. Procter and Gamble (P&G) gets at least 100 qualified applications for every chemist it hires; often the ratio is 150:1. When Ron Webb, P&G's manager of doctoral recruiting and university relations, reviews candidate résumés, the first thing he looks at is technical mastery. Next, he looks at publications and conference presentations. "We are looking for people who have a history of publishing and presenting. If the résumé doesn't have those two key elements, they'll be at a competitive disadvantage."

Webb also looks for "soft" skills, such as leadership, the ability to collaborate and to work in teams, creativity, problem-solving ability, and communication skills, as well as the ability to prioritize work. "At P&G, when someone comes for a day visit to be considered for a job offer, typically an hour of that day will be set aside for a three-person panel to probe these areas and find out what kind of history these individuals have in terms of demonstrating whether these skills are present," says Webb.

Even chemists applying for jobs in hot areas need strong communication skills to stand out among hundreds of other highly qualified candidates vying for a few positions. "An enormous amount of whether they will get hired or not will rest on their ability to communicate effectively during the interview process, which usually includes giving a seminar," Genentech's Varney says. "I would encourage them to practice extensively before they go out and interview."

Like other pharmaceutical companies, Genentech also seeks refined scientific skills, a passion for helping people and patients through drug discovery, and a talent for collaboration. "All of what we do is focused on high-quality science, so we look for the best scientists first," says Varney. "But in small-molecule efforts, it is the ability to work in teams that make you successful."

"All of what we do is focused on high-quality science, so we look for the best scientists first."

Michael Varney, Genentech

George Wang is a case in point. He earned his Ph.D. from Princeton University, and along the way he managed to assemble a package of skills he could sell to the pharmaceutical industry. Wang's Ph.D. focused on developing and characterizing novel catalysts, which required training in analytical and organic chemistry. "I planned to find a job in industry after completing graduate studies, but I knew it would be challenging to enter the field with no industry experience," he says. His breadth of training helped him land a position as a research chemist at Bristol-Myers Squibb. "I applied for a job with the Analytical Research and Development Department at Bristol-Myers Squibb," he says, "and I received a job offer."

The right connections

Rick Davis, a polymer chemist who has worked for a year and a half at ExxonMobil in Baytown, Texas, didn't move straight into industry after finishing his Ph.D. in polymer science and engineering at the University of Southern Mississippi. First he "wanted to see what caught my eye, what interested me," he says. "I looked at postdoc positions, companies, and also teaching positions, just examining what was out there." He accepted a National Research Council postdoc in the Fire Research Division at the National Institute of Standards and Technology (NIST) in Gaithersburg, Maryland. A year later, he took a permanent position at NIST as a research chemist in the same division and spent the next 3 years developing methods to generate polymers and test their flammability.

While at NIST, Davis kept in contact with industry managers by presenting at conferences. These interactions led to networking opportunities and eventually to his present position. "Someone from ExxonMobil approached me and asked if I would be interested in interviewing, and I did. I enjoyed working at NIST but felt the opportunities at ExxonMobil better matched my long-term career goals." Davis is now responsible for leading teams through the adoption of new high-throughput methods of research and development in polymer science — generating dozens of unique materials at a time and rapidly screening them — and finding ways to implement the most promising candidates in R&D labs across the company. "I am very happy with my decision," he says.

Networking was also a key to Rolanda Johnson's eventual success in her job search. While she was in graduate school, Johnson participated in a weeklong summer program at P&G, where she established contact with Webb. Years later, this connection led to an interview and eventually a job at P&G. "My advice to chemists looking for a job in industry is to start early and make contacts by going to conferences," she says. iC

Robin Arnette is the editor of MiSciNet.

JUPITERIMAGES

Opportunities For B.S. and M.S. Chemists

Companies in a variety of areas are looking to hire in traditional and nontraditional areas

By Susan J. Ainsworth

Chemists – especially those who plan to look for a job in industry in the coming months – may be ringing in the new year with some trepidation.

Many of their potential employers are still trying to catch their balance after being dealt a number of painful blows in 2005 – from unprecedented disruptions caused by hurricanes to astronomical petroleum and feedstock costs – all within the context of prolonged economic uncertainty.

In particular, pharmaceutical firms – the largest employer of chemists – continue to be antagonized by a number of lingering controversies and challenges, including patent expirations on key drugs, late-stage disappointments for products in the development pipeline, and more stringent drug approval processes.

These factors are likely to have a dampening effect on the job market for chemists in 2006. Just over a month ago, for example, drug giant Merck announced that it would eliminate 7,000 positions, or 11% of its workforce, by the end of 2008 (C&EN, Dec. 5, 2005, page 9). The move comes on the heels of the company's recent withdrawal of Vioxx, its big-ticket arthritis and acute pain medication, from the market.

Still, some say the outlook for B.S.- and M.S.-level chemists, in particular, may not be all that grim. As 2006 unfolds, well-qualified B.S.- and M.S.-level chemists–freshly minted, as well as experienced – should be able to find many doors of opportunity on which to knock across a range of industries.

On-campus recruiting of job-seeking B.S. and M.S. chemists – one indicator of that market – has picked up, compared with a year ago, according to some schools. "The climate has improved this year," says Jane Scheiber, assistant dean for college relations in the College of Chemistry at the University of California, Berkeley. "We have a few more companies recruiting, and there are more interview slots per company," she reports, noting that about one-third of UC Berkeley's B.S. chemists typically go into industry, and the rest go on to graduate school or professional schools. At the same time, she says, "companies are showing considerable interest" in hiring interns.

The companies that are scouting undergraduate-degreed chemists at UC Berkeley are diverse and include those from the chemical, high-tech, aerospace, consulting, medical devices, petroleum, and biotech industries, Scheiber observes. Although the large pharmaceutical companies are recruiting as well, they tend to "focus more on our doctoral and postdoctoral students," she says.

To be sure, more than a few companies – including some in the biotechnology arena – say their recruiting of B.S.- and M.S.-level chemists is on the upswing. In particular, some biopharmaceutical firms are expanding their staffs in the wake of a number of recent regulatory approvals or successful product launches.

For example, Gilead Sciences, which has been awarded Food & Drug Administration approval for four drugs in less than three years, plans to hire more scientists in 2006. The move fits with a company effort to step up R&D spending, which has not kept pace with its rapid revenue growth, according to Norbert W. Bischofberger, the company's executive vice president for R&D. Still a growing company, "we should probably be spending a lot more than a big pharmaceutical company such as Pfizer, but right now, we are spending less," he says.

As part of that effort, "our interest in hiring B.S.- and M.S.-level chemists is certainly up right now," Bischofberger notes. In fact, Gilead's growth supports hiring at a ratio of two B.S.- or M.S.-level chemists to every one Ph.D., he says. However, meeting that quota is difficult, says Bischofberger, who finds that the supply of well-qualified B.S.- and M.S.-level chemists is much lower than demand for them.

"Often, people who have finished their B.S. degree don't know what they want to do next, and they use a job as a stepping stone to something else. So they might hang around for two or three years and then go and do what they really want to do – go back to graduate school or go into another field," he laments. Master's-level chemists are even more evasive, according Bischofberger. "In my experience, most go on to get a Ph.D.," and few are available for hire.

Despite these challenges, Gilead will be looking to hire a mix of experienced B.S.- and M.S.-level chemists as well as new graduates – especially those who have done some sort of practical lab work while in school. In particular, the company is on the prowl for synthetic and analytical chemists, says Bischofberger.

STARTING SALARIES BY WORK EXPERIENCE

Experience prior to graduation boosts salaries of new chemistry graduates

	B.A./B.S.			M.S.		
$ THOUSANDS	2003	2004	2005	2003	2004	2005
Less than 12 months	$32.0	$32.5	$35.0	$44.5	$43.6	$45.0
12–36 months	35.0	35.0	37.4	45.0	43.8	45.4
More than 36 months	39.0	40.0	40.0	54.0	52.0	55.8
ALL	$33.0	$33.5	$35.0	$48.0	$45.0	$50.0

NOTE: Median annual salaries of new chemistry graduates with full-time permanent employment as of early October of each year.

"Class of 2005 Salaries & Jobs" **Chemical & Engineering News**, August 7, 2006.

"We are also looking for chemists to help out in our preformulation area, which we are staffing up."

Like Gilead, Amgen expects its hiring of B.S.- and M.S.-level chemists in 2006 to increase relative to last year. "This group represents a key need in our organization at this point in time," says Randy Hungate, Amgen's senior director of medicinal chemistry.

Although Amgen has the strongest demand for candidates with a background in organic chemistry and synthesis, there are opportunities for analytical chemists as well, says Hungate. Individuals who have practical experience gained during their undergraduate career or in industry will have an edge, he notes.

Amgen tends to plug its B.S.- and M.S.-degreed chemists into jobs that involve laboratory work in either its medicinal chemistry or process chemistry synthesis groups. "In most cases, these individuals would be working as part of a larger team directed toward the identification of potential development candidates."

In fact, "B.S.- and M.S.-level chemists – especially those who are at the front lines making new compounds – can play a key role" in Amgen's team environment, says Hungate. Because of Amgen's matrix organizational structure, "every project team member has access to all the data the team generates," he notes. "Although I would not expect an entry-level B.S. or M.S. chemist to be able to integrate all that data at once, they can certainly grow in their abilities to provide critical input on projects, especially as it relates to new intellectual property."

Not surprisingly, Amgen also offers its undergraduate-degreed chemists opportunities to advance into management. In its medicinal chemistry group, for example, "we have hired a number of B.S. and M.S. chemists who have risen through the ranks and are now supervising their respective programs," Hungate says.

Biotechnology pioneer Genentech is also offering increased opportunities to B.S.- and M.S.-level chemists. The company has stepped up hiring in all departments following "positive outcomes in Phase III clinical trials over the last several years and an unprecedented string of approvals" for drugs including Avastin, a cancer therapy, according to a company spokeswoman.

In 2004 and in 2005, Genentech set a goal of hiring 1,500 total employees per year companywide, which in 2004 represented about 23% growth in hiring. Although Genentech has not yet disclosed its projection figures for 2006, "we do anticipate that we will continue to recruit aggressively in a way that is consistent with the company's growth in general," says Michael Varney, vice president of Genentech's small-molecule drug discovery group.

In particular, the small-molecule arena is a growth area for Genentech, notes Varney. In staffing that group in 2006, the company will favor experienced chemists over new graduates and hire both Ph.D.s and those without graduate degrees.

At the B.S. and M.S. levels, Genentech will be looking for medicinal chemists and process chemists who can demonstrate synthetic chemistry skills. Candidates who can demonstrate an ability to "synthesize difficult molecules more than once" will have an edge over those who "simply worked on a particular synthetic method and ran a reaction a hundred different ways," says Varney.

Depending on their level of experience, B.S.- and M.S.-degreed chemists in Genentech's medicinal chemistry group may take on jobs that range from making assigned compounds to participating in the design of synthetic routes to designing and making their own compounds, says Varney. They are "full-fledged members" of Genentech's various project teams, he says, "and they contribute greatly, because at least in our world, there is nothing until there is a compound. And they are the ones who make the compounds."

Within traditional chemical companies as well, chemists with B.S. and M.S. degrees may have more chances to contribute to business success right now.

"Actually, the job market is stronger

FACTORS INFLUENCING BACHELOR'S SALARIES

	$ THOUSANDS
BY DEGREE	
B.A.	$33.0
B.S.	35.0
BY CERTIFICATION	
ACS certified	35.9
Not ACS certified	33.2
BY GRADE-POINT AVERAGE	
A	35.7
A–	34.1
B	33.8
C	36.0

NUMBER OF EMPLOYEES	$ THOUSANDS
Fewer than 50	$28.7
50 to 99	34.5
100 to 499	32.0
500 to 2,499	35.5
2,500 to 9,999	35.6
10,000 to 24,999	35.0
25,000 or more	42.8

NOTE: Median salaries as of early October 2005 of inexperienced 2005 graduates with permanent full-time jobs and less than one year of work experience prior to graduation.

"Class of 2005 Salaries & Jobs" **Chemical & Engineering News**, August 7, 2006.

than it has been in a couple of years," says Sarah Kok, workforce planning specialist at Dow Chemical. "So it's a good year to be graduating with chemistry and chemical engineering degrees."

Dow anticipates bringing in more graduates in 2006 than it has in the past few years, she says. Hiring, however, will be balanced between experienced people and those who are right out of school. In addition to chemists, the company plans to increase hiring of biologists and chemical, mechanical, industrial, electrical, and civil engineers. Most of the hiring "will be concentrated at the bachelor's-degree level," she adds.


JUPITERIMAGES

Dow's robust hiring plans are part of a strategy to meet "significant growth" in some specific business segments now and into the near future, says Kok, who declined to identify the targeted areas.

In particular, B.S.- and M.S.-level chemists can delve into three general areas within Dow: analytical sciences in the lab, pilot plant testing, and production and process R&D. "And we don't make them wait until they have worked here for 10 years before they get involved with big projects," Kok points out. "In fact, it is very common for us to ask entry-level chemists or engineers to make contributions in our cross-functional, cross-geographic teams from day one."

To further leverage new hires' effectiveness in the organization, Dow puts them through a special rotational assignments program, which "exposes them to a range of opportunities and gives them a foundation of experience very quickly," says Kok. "When they are finished, they are grounded with excellent skills and experience that they can apply later on."

To support a similar set of programs, W.R. Grace plans to bring in an increased number of recruits, including B.S.- and M.S.-level chemists, in 2006, according to Troy L. Vincent, the company's vice president of human resources for the Americas. "Our goal is to hire approximately 20 people into one of our two-year, rotational leadership development programs."

Through these two programs, which are geared toward either marketing or finance, Grace identifies and develops high-potential individuals for leadership positions within the company, he says. Program participants are partnered with a senior-level mentor who follows their progress and provides guidance and support. Participants rotate through different business units in assignments that are designed to provide a broad range of business experiences and strengthen leadership skills.

Huntsman is another chemical company that is opening its doors to more chemists right now. The company has stepped up hiring following the consolidation of its research units this past summer. In that move, Huntsman shuttered four research facilities – in Austin, Texas; West Deptford, N.J.; Brewster, N.Y.; and Los Angeles – and brought all those activities under one roof in a new technology center in The Woodlands, Texas. "A lot of people didn't desire to make the move, and so we are experiencing a definite blip in the curve in terms of the total hiring level," according to Brian Pellon, vice president of R&D at Huntsman's Advanced Techology Center.

Even in the absence of a consolidation effort, however, hiring at Huntsman would not have been down this year, Pellon predicts. "Certainly, high feedstock costs have impacted all chemical companies' profitability and earnings," he says. But even in the face of these challenges, Huntsman thinks "it is important to continue to bring in new employees who can develop products and provide service and technical support."

In all its candidates, Huntsman favors those with experience. "It would be a rare case that we would hire someone right out of school," says Pellon. "We'd rather have someone with some level of experience who can hit the ground running a little faster."

In the coming months, Huntsman is primarily targeting Ph.D.-level candidates, who can deliver "very strong expertise in specific fields of chemistry," Pellon says. However, the company plans to bring in some experienced undergraduate-degreed chemists to work in its various research groups as well as in its analytical and physical testing areas. And within its technology development groups, Huntsman will be looking for B.S.- and M.S.-level chemical engineers, who are needed to support its bench-scale or pilot-scale activities.

Chemical engineers at the B.S. and M.S. level are also in demand at BP America. "At BP, we recruit mostly B.S. chemical engineers, as well as a handful of Ph.D. chemical engineers and one or two Ph.D. chemists," says Susan Knox Wilson, manager for recruitment marketing at BP America. "Our needs for B.S.-degreed chemical engineers are up about 30% because of increased needs in our exploration and production sector."

Outside of the industries that traditionally hire chemists, job seekers with B.S. and M.S. degrees may find some exciting pockets of opportunity.

For example, investment firms such as Chicago-based First Analysis periodically scope out chemists. Some might think it is "a little strange for an investment firm to be recruiting chemists," says Dave Leshuk, senior vice president at First Analysis. "But we recognize that large portions of the economy are driven by chemistry. Someone with a chemistry background may have an edge in identifying great investment opportunities in those sectors."

As a smaller firm, First Analysis does relatively little hiring. But right now, the company is looking for an entry-level associate to focus on specialty chemical companies. The ideal candidate would have completed a B.S. or M.S. degree in chemistry, as well as a handful of business or management courses. "A year or two of experience in industry would be helpful as well," says Leshuk. "Anything more would be overkill in this position."

Finding chemists with the right skills and inclinations for the investment world is not always easy, Leshuk points out. Chemists coming into an investment firm, he cautions, "need to understand finance and love the stock market. They have to like crunching numbers. They need to enjoy interacting with clients and companies and building networks."

With that kind of interest inventory, a chemist can potentially be a natural in the business of finance. In that line of work, "it's important to be innately inquisitive," and that is something that

is second nature to chemists, says Allan H. Cohen, managing director at First Analysis, who is a Ph.D. chemist. And much of the methodology of chemical research – including forming a hypothesis and gathering relevant information – is directly applicable to the work done in an investment firm, he notes.

In fact, chemists' way of identifying and analyzing problems may make them attractive to some other businesses that are removed from the science of chemistry. One such company is CNA, a nonprofit research organization based in Alexandria, Va., that employs about 300 researchers to provide data and analysis to leaders in the military and public-sector organizations.

"We have been actively recruiting people with "hard science backgrounds – including chemists – who have completed a master's thesis," according to Katherine A. McGrady, the company's senior vice president for research, who is a Ph.D. chemist. "We have found that scientists who have done a thesis have really gone through a process that's very similar to the kind of thing that we need analysts here to be able to do," she adds.

Chemists at CNA work in teams and with its clients on very quantitative projects in settings that are completely removed from the traditional lab environment, says McGrady. "Few chemists think of themselves as somebody who might be deployed to the Middle East to do research, but this is what a lot of chemists like myself have done."

In fact, the company is currently recruiting people who are open to this kind of work. It plans to add 50 to 60 people – a mix of chemists, physicists, mathematicians, biologists, biochemists, and engineers.

It's important for candidates to demonstrate their affinity for communicating and participating in a team environment.

Whether in nontraditional or traditional fields, job opportunities for B.S.- and M.S.-level chemists seem to be scattered over many industries right now. For example, at the University of Delaware, a range of companies – 131 in total – are listed as seeking B.S.- or M.S.- level chemists in its recruiting database, according to David J. Berilla, associate director of the university's Career Services Center.

"I have observed that we have more requests for chemists than we have had in the past several years," says Berilla. "We definitely had an increase in recruiting activity this fall through our job fairs, campus interviewing, and job postings." However, "we don't yet have the statistics to know how this compares with this time last year." The center compiles and releases figures about job placement about six months after graduation. The report on the class of 2004–05 will be finalized later this month as part of the center's Career Plans Survey.

Berilla reports that pharmaceutical and biotechnology firms are not among those scouting for B.S.- and M.S.-level chemists in his neck of the woods. "Instead," he says, "they are more interested in Ph.D.-level chemists and chemical engineers."

But the opposite is true in Southern California, which is home to numerous biotechnology firms and research organizations. "Our 4.4% unemployment rate in San Diego County, coupled with a strong biotech industry focus, has proven successful for our students both this year and the previous year," says Andy Rabitoy, assistant director of the Job Opportunities Program at the University of California, San Diego. "As a whole, the climate in the San Diego area has been very positive for our chemists."

The number of participants – including drug and biotech firms – at UC San Diego's Fall Science & Technical Job Fair rose by 20% this year as compared with 2004–05, he notes. "We are optimistic that this trend will continue to grow."

However, not all universities are upbeat about the current job market for their B.S. and M.S. chemists right now. The recruiting environment for B.S.- and M.S.-degreed chemists is only "moderately better" this year at the University of Texas, Austin, according to Diane Kneeland, the school's senior career adviser for chemistry. Of the 20 recruiters who visit the university each fall, most of them are in the pharmaceutical business, recruiting almost exclusively at the graduate level. "No one has expressed a huge interest in hiring this year, although we had a good showing from Schering-Plough," she adds.

The situation is much the same at Ohio State University. Most of the on-campus recruiters, who dropped in number to 10 this year from 15 a year ago, are from the drug industry, and they are looking for Ph.D.-level candidates, according to Jennifer Bates, the university's graduate admissions secretary for the department of chemistry. "No one seems hungry for chemists. In fact, the job market does not seem very good," she adds, pointing to the impending layoffs at Merck.

To be sure, the job market for B.S. and M.S. chemists remains competitive.

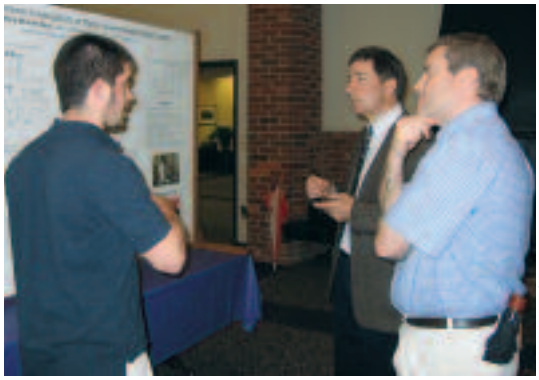
To land a first job or a better position, chemists need to know how to differentiate themselves from the pack.

In particular, recruiters want undergraduates "with initiative" who have done research, an area of emphasis at UC Berkeley, according to Scheiber. "Specifics can be taught, but companies want the broad experience in areas such as research techniques and safety standards."

To gain an edge, it's important for candidates to demonstrate their affinity for communicating and participating in a team environment, Gilead's Bischofberger says. "You have to be able to leave your big ego outside. The days of the lone ranger in the lab making a big discovery are gone. They've been gone for a long time."

And strong communication skills are "really the key" to landing a job in today's tight job market, says Huntsman's Pellon. A candidate can have the best education background and stellar work experience, he says, "but it comes down to how well that person can share that with a prospective employer, communicating specifically how he or she can be of benefit to the organization." Now, more than ever, he says, "it's all about selling yourself." iC

SUSAN J. AINSWORTH is a contributing editor to **Chemical & Engineering News**.



FURMAN UNIVERSITY

Brad Mess discusses his research with John Wheeler and Thomas Kazee at the Furman University Science Poster Fair, April 2006.

Your First Research Presentation

By Timothy Hanks

SO YOU'VE STRUGGLED for months in the laboratory and made some discoveries. Are you now a practicing scientist?

Well, almost. Those discoveries aren't "real" until others hear about them! The two pillars of modern science are the scientific method itself and the broad dissemination of ideas flowing from that method. The scientific method ensures that ideas are rigorously tested against alternative theories and that they are supported by both data and logic.

As important as the scientific method is, it is the presentation of information to the scientific community that has made science such a powerful discipline. As a scientist, you will be called upon to present your work to various audiences throughout your career. The ability to present your results clearly and concisely is second in importance only to the quality of your work.

Your first research poster or talk in a professional forum can be a frightening experience, but it will also be one of your most memorable and interesting scientific milestones. One way to make things easier is to be certain that your presentation is a good one. This article will provide you with some hints and strategies for avoiding common presentation pitfalls, while making the best use of the medium for getting your message across.

General Considerations

Before even thinking about making a research presentation, *be sure to consult with your research mentor.* There are several reasons for doing this, but foremost is that of courtesy. When you present results, you are nearly always working as part of a team. It is important that the contributions of each team member are properly acknowledged and that your discussion of the group's results is as accurate as possible. The project leader is the person best able to ensure that these requirements are met.

Another critical consideration is the information itself. While a discussion of ownership of intellectual property is beyond the scope of this article, suffice it to say that the premature disclosure of information could jeopardize the award of a patent or damage an industrial sponsor. Science is a team sport, so make sure that your entire team is supporting your presentation.

Once you are cleared to make a presentation, *do your homework!* There is a story around every project … and you should know yours. Why is your team interested in this area? What have previous group members discovered that is related to your work? Where might this research lead? While you certainly do not need to follow a strict chronology of events in your presentation, the story gives your work relevance and brings it to life.

FURMAN UNIVERSITY

Jennifer Kauffman presents a poster at the joint ACS Southeast/Southwest Regional Meeting in Memphis, November 2005.

Poster Presentations

Posters were once thought to be "second tier" presentations, lower in status and importance to talks. This perception is rapidly changing, as chemists discover the distinctive benefits of posters. In fact, your author actually prefers to present a poster as opposed to a talk in many instances. One advantage to a poster is that the people who come to speak with you about it are genuinely interested in your work, while some of the audience in a talk may be there simply because it is too much bother to "change the channel" by walking to another room. Another advantage is that conversations around a poster are two-way educational experiences, while talks tend to be one-way transfers of information. A poster session will allow for longer and more detailed discussions than are possible during the five minutes of questions at the end of a talk.

Getting the most out of a poster session takes some preparation. Here are some hints to make your session more productive and fun:

1. **Think big**. People will be reading your poster from 3–5 feet away, and some of your audience may not have the same acuity of vision that you do. In addition, the lighting is not always perfect. Use a font size of 26 points or so; even larger for headings and titles.
2. **Fewer words, more graphics.** An introduction and conclusion are good, but most of the rest should be in the form of figures, tables, and schemes. Key findings and captions spread throughout can help the audience follow your logic.
3. **Organize.** Your audience generally will not be able to read the entire poster from left to right, due to the presence of other people. So don't think of the poster as being a single giant page. Instead, arrange your information into two or three columns so that people can read a portion of your work, then move a couple of feet to see the rest. Use visual clues to show the flow of your poster, such as numbered sections, boxes around sections, or others.
4. **Sell your poster.** When someone walks up to your poster, give them a few seconds to get an idea of the topic. If they show some interest, politely ask them if you can "walk them through it." In some cases, they may simply want to glance over the work and move on, but you have let them know that it is your poster and that you are eager to discuss it. This seems a bit awkward at first, but a couple of sentences on your part can make the difference between a lost opportunity and a fascinating discussion. If they would like to hear more, give them a three-minute summary and then try to engage them in conversation about specific points. Once the ice is broken, very interesting and productive discussions often result.

FURMAN UNIVERSITY

Laura Glish and Hadi Arman present their poster at the joint ACS Southeast/Southwest Regional Meeting in Memphis, November 2005.

Oral Presentations

Standing up in front of an audience of professional chemists and telling them about your discoveries can be as rewarding as it is terrifying. Public speaking is an art, but it is something you will be called upon to do throughout your career. Here are some key concepts that you should think about before grabbing a laser pointer and opening your mouth.

1. **Structure your talk carefully.** You need to grab your audience's attention quickly and keep them focused on your message. It is also important to give them a conceptual outline. Saving a few surprises for later in the talk is fine, but your audience should quickly get a feel for the overall direction of the talk.
2. **Develop good presentation skills.** Remember to make eye contact! Don't lecture to the screen. Use your pointer (laser or otherwise) sparingly. Don't repeatedly circle slide details or wave the pointer about randomly.
3. **Don't read your slides.** Your audience is literate, so treat them with respect. It is fine to have a few slides that have bulleted points for emphasis, but explain the bullets rather than read them. Most of your slides should be based upon graphical images. A title on each slide will help the audience to quickly grasp your key point, allowing them to focus on your detailed discussion.
4. **Engage the audience.** Don't read from a set of prepared comments. Know the key points for each slide and make them forcefully. The best speakers are watching the audience to make sure their points are understood. They are happy to spend an extra minute to clarify a key topic when the expressions of their listeners show confusion.
5. **If you don't know, say so.** Of course, it is best to have a great answer to every question your audience asks, but sometimes you don't. It may be that a clarification of the question will help, but if you don't know the answer, admit it. Your audience will forgive you for not knowing, but not for trying to pass off incorrect information or by giving a rambling non-answer.

Finding a Conference

There are many different venues for presenting your research, ranging from local, undergraduate-specific meetings to large national or international conferences. The appropriate meeting for you will depend upon numerous factors, including the topic and scope of your work, the availability of travel funds, and the preferences of your mentor.

Of course, some of the very best places to present are ACS national and regional meetings. Both offer undergraduate-specific programming and events. National meetings are very large, exciting, and they can be expensive. Regional meetings are more intimate, and the undergraduate programming is often more closely tied into the meeting as a whole. Many students find regional meetings to be the perfect combination of scientific rigor and friendly atmosphere. Wherever you decide to present your results, a little preparation will ensure that your first presentation will be an exciting and educational introduction to a career in chemistry. iC

TIMOTHY HANKS is a professor in the Department of Chemistry at Furman University, Greenville, SC.

JUPITERIMAGES

Undergraduate Program
233rd ACS National Meeting, Chicago, IL
March 25 – 29, 2007

The Society Committee on Education's Task Force on Undergraduate Programming invites you to join us for the 233rd ACS national meeting in Chicago. As you can see below, we have put together a terrific program that will offer you the opportunity to present research, learn about new research, and network with chemists from around the country. You won't want to miss the Eminent Scientist Lecture, the Undergraduate Social, or the annual SAACS Chapter Awards Ceremony. Don't miss out! I look forward to seeing you in Chicago!

Sincerely,

Mark Benvenuto
2007 Chicago Program Chair
Task Force on Undergraduate Programming

SUNDAY, MARCH 25

All the times are tentative.

8:00 a.m. – 5:00 p.m.
Hospitality Center

9:00 – 10:30 a.m.
Kids & Chemistry Workshop

9:00 – 10:30 a.m.
Graduate School Reality Check

10:30 a.m. – noon
Graduate School Recruiting Tea

10:30 a.m. – noon
Chem Demo Exchange using Household Chemicals

2:30 – 4:00 p.m.
Automotive Chemistry I: *More Than Just the Tail Pipe*

4:00 – 5:00 p.m.
Dress For Success Workshop

7:00 – 8:30 p.m.
Student Affiliates Chapter Awards Ceremony

8:30 – 11:30 p.m.
Undergraduate Social

MONDAY, MARCH 26

8:00 – 10:00 a.m.
Graduate School Recruiting Breakfast

9:00 – 10:00 a.m.
Writing the SAACS Annual Report

9:00 – 10:00 a.m.
Faculty Advisor Coffee Break

10:00 – 11:00 a.m.
Automotive Chemistry II: *More Than Just the Tail Pipe*

11:00 a.m. – 1:00 p.m.
Undergraduate Research Poster Session I

2:00 – 4:00 p.m.
Undergraduate Research Poster Session II

5:00 – 6:00 p.m.
Eminent Scientist Lecture featuring Professor Omar Yaghi: Making Molecules for Hydrogen Storage

6:00 – 7:30 p.m.
Corporation Associates Reception for Undergraduates

8:00 – 10:00 p.m.
Sci-Mix / Successful Student Affiliates Chapter Poster Session

Program format and times are subject to change. Please consult the final program.

JUPITERIMAGES

MARK YOUR CALENDARS FOR THE GRADUATE SCHOOL RECRUITING BREAKFAST!

Undergraduates – here's your opportunity to discuss the ins and outs of graduate school programs with faculty, staff, and current students!

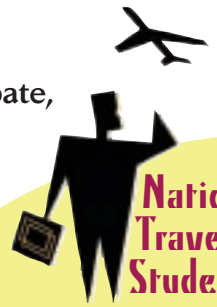
The Graduate School Recruiting Breakfast brings you together with representatives from a variety of prestigious graduate programs. You'll meet other prospective graduate school students and obtain valuable information in an informal and informative setting.

The breakfast will be held on Monday, March 26th from 8:00 – 10:00 a.m. as part of the 233rd ACS Spring National Meeting in Chicago. Don't miss this great networking opportunity!

ATTENTION:

Graduate School Administrators and Representatives!

If you would like your school to participate, please contact Adam Boyd, ACS Undergraduate Programs Office, at 800-227-5558, ext. 6188 or a_boyd@acs.org. Registration materials are available under meetings at chemistry.org/education/saprogram.html.



National Meeting Travel Grants available for Student Affiliates Chapters

Sending undergraduates to the ACS National Meeting in Chicago? Up to 65 grants of $275 are available to active Student Affiliates chapters with students who are presenting individual research or chapter posters in the Division of Chemical Education's Undergraduate Research Poster Session.

Apply by January 15, 2007!

2007 ACS Regional Meetings

39th Middle Atlantic Regional Meeting

May 16–18, Collegeville, PA
http://www.marmacs.org

An undergraduate program will be hosted by the Temple University Student Affiliates Chapter.

Thursday, May 17

Chapter Presentations
Keynote Speaker
Undergraduate Poster Session I
Graduate School Workshop
Undergraduate Poster Session II

Friday, May 18

Breakfast
Undergraduate Poster Session III

39th Central Regional Meeting

May 20–23, Covington, KY
http://www.cermacs2007.org

An undergraduate program will be hosted by the Student Affiliates Chapter at Northern Kentucky University.

Sunday, May 20

Ice Cream Social
Career Workshops
Undergraduate Poster Session
Undergraduate Reception/Networking

Monday, May 21

Breakfast
Career Paths Symposium/Panel Discussion
Career Workshop
Poster Session

62nd Northwest Regional Meeting

June 17–20, Boise, ID
http://northwestchemistry.org/Norm_2007/index.htm

An undergraduate program will be hosted by the Eastern Oregon University Student Affiliates Chapter.

Monday, June 18

Chem Demo Exchange
Eminent Scientist Lecturer
Undergraduate Poster Session

Tuesday, June 19

Tour of Micron Technology

Coming in the fall…

20th Rocky Mountain Regional Meeting
August 30–September 1, Denver, CO

41st Western Regional Meeting
October 10–13, San Diego, CA
http://www.wrmacs.org

59th Southeastern Regional Meeting
October 24–27, Greenville, SC
http://www.sermacs2007.org

62nd Southwestern Regional Meeting
November 4–7, Lubbock, TX

42nd Midwest Regional Meeting
November 7–10, Kansas City, MO

All events are tentative. Please consult final program for any changes.