The Magazine for ACS Student Affiliates
Volume 16 ■ Number 1
September/October 2006

in Chemistry

COURTESY OF DEPAUW UNIVERSITY

COURTESY OF UNIVERSITY OF PITTSBURGH-TITUSVILLE

Cover: Getty Images, Microscopic Backgrounds. Inset photo courtesy of University of Pittsburgh-Titusville

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.


MIKE FREMANTLE, C&EN

Worth the Price of Admission

By E. Ann Nalley

WHAT DO I GET FOR MY dues? is a question that members of any organization can and should ask. Being a chapter faculty advisor, I know that Student Affiliates also ask this question often, even though they have significantly reduced dues.

In case you haven't already convinced yourself that the benefits are worth the price, I'd like to share my answer with you. Actually, Student Affiliates enjoy nearly all of the same benefits that ACS members do. There are simply too many to list them all here, so I have created **Ann Nally's Sweet Sixteen** list.

Why should you affiliate with or become a member of the American Chemical Society?

1. As a chemist or scientist, you will be a professional practitioner of chemistry, whether you choose to become an industrial scientist or educator, or to pursue a non-traditional career. ACS is the society for chemical professionals — and I contend that part of being a chemist is supporting your professional society. ACS promotes the profession in general, and more importantly, builds appreciation of the field's positive contributions to people's lives among other disciplines, industries, and the public. The Society's new vision statement, "Improving people's lives through the transforming power of chemistry," emphasizes this central role that ACS performs for the chemistry profession.

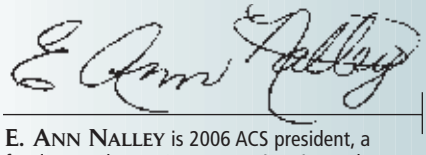
This alone should be a good reason to continue your affiliation with or membership in ACS. But if you need more convincing, how about another 15 reasons? To provide value to its members and Student Affiliates, ACS also:

2. Provides a suite of career services at all levels;
3. Champions high standards of professional competence, integrity, and ethics;
4. Advocates for improved working conditions for members of the profession;
5. Strives to increase standards of professional excellence in research, investigation, education, and publicity;
6. Offers a variety of forums for chemical professionals to communicate the results of their research and scholarly activities;
7. Helps students recognize the importance of studying chemistry and chemical engineering;
8. Supports its members' acquisition of knowledge, skills, and proficiencies related to careers in chemistry and chemical engineering;
9. Provides opportunities for networking, not only among members, but also with professionals in related fields;
10. Encourages dialogue among professional peers to solve problems and strategize ways to enhance the field's future;
11. Enables members' continued professional development through opportunities to serve the profession and communities through volunteer activities;
12. Upholds professional standards through continuing education programs;
13. Strengthens the profession through programs that support and encourage diversity;
14. Fosters government support of fundamental research and science education;
15. Helps ensure a sustainable future through the Green Chemistry Institute; and
16. Offers discounts on a range of activities and services, meetings, journals, insurance, and more.

These are only 16 of the many reasons why you should continue your membership in ACS, YOUR PROFESSIONAL SOCIETY. For more complete list, please refer to http://www.chemistry.org/portal/a/c/s/1/newmember.html.

Some of these benefits are valuable to you now. Others will become more so as your career progresses. Ultimately, what you get out of the Society will depend a lot on what you put into it. Pursuing opportunities to participate in Student Affiliates and other ACS activities will help you develop professional skills — including leadership, communication, teaching, and mentoring, as well as other organizational and human relations skills. Be sure to note these skills on your résumé, as they will be assets throughout your career.

Student Affiliation in ACS is a bargain. ACS membership is a good value. Establishing career assets is priceless. IC



E. Ann Nalley is 2006 ACS president, a faculty member at Cameron University, and a Student Affiliates chapter faculty advisor.

What's UP?

A Quick Look at the Undergraduate Programs 2006–2007 Calendar

By Andrea T. Bennett

ACS STAFF

Left to right: Andrea Bennett, Adam Boyd, Robin Lindsey, and Alicia Chambers.

Welcome to the September–October 2006 issue of *in Chemistry* … and to another exciting academic year! As you return to campus, catch up on old friendships, and strike up new ones, I'd like to take this opportunity to introduce myself to you.

I already know many of you from Kids & Chemistry Workshops I've presented as part of the undergraduate program at ACS national and regional meetings, as well as at many of your campuses. I've also had the opportunity over the years to work with a number of chapters that volunteered to present hands-on activities to children at Kids & Chemistry LIVE!, our annual public outreach event held in conjunction with the ACS national meeting.

Without a doubt, these interactions with Student Affiliates and their advisors have been one of the most enjoyable aspects of my work at ACS. That's why I am both delighted and excited to be working full-time with the program now as its new program manager, and I look forward to getting to know many more of you in the future.

I am also very fortunate to be working with and, more importantly, learning from my Undergraduate Programs colleagues, all of whom are committed to making your Student Affiliates experience as rewarding as possible. As you begin to plan your activities for the year, I urge you to contact them whenever you need to, and take advantage of their expertise and experience. They can assist you with a variety of chapter activities, including recruiting members, planning regional meeting programs, conducting outreach, organizing career-related programs, obtaining funding, and more. Your key undergraduate program contacts are:

- **Alicia Chambers** (a_chambers@acs.org) for National Meeting Travel Grants, Innovative Activities Grants, Community Interaction-Student Affiliates Grants, career workshops at national meetings, undergraduate programming at regional meetings, and outreach to chapters at two-year colleges and minority serving institutions;
- **Adam Boyd** (a_boyd@acs.org) for Experiential Programs in Chemistry, career materials, graduate school recruiting events, and chapter workshops at national meetings; and
- **Robin Lindsey** (r_lindsey@acs.org) for Student Affiliates chapter activation and reactivation, chapter activity kits, chapter annual reports, and Student Affiliates merchandise.

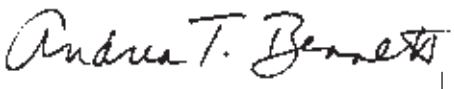
As you plan for the 2006-2007 school year, please add to your calendars the 232nd and 233rd ACS national meetings, to be held in San Francisco and Chicago, respectively. All undergraduate chemical science students are invited to join us for these dynamic and educational meetings.

The undergraduate program for the San Francisco meeting will be hosted on Sunday and Monday, September 10–11, 2006. The program will feature symposia on the environmental impact of natural disasters and nanotechnology, as well as a presentation from eminent scientist Robert H. Grubbs, winner of the 2005 Nobel Prize in chemistry.

The Chicago undergraduate program, to be held Sunday and Monday, March 25-26, 2007, will feature a two-day symposium on automotive chemistry. In addition, both meetings will feature our highly popular array of career workshops, graduate school recruiting sessions, faculty advisor workshops, and Kids & Chemistry training. Be sure to visit the Student Affiliates web site at chemistry.org/education/saprogram.html for more information.

Finally, if you haven't already heard … this new academic year also brings a significant change in the Student Affiliates term. All Student Affiliation terms will now be processed on a rolling basis. The new guidelines will allow the affiliation term to begin the date that the application is processed, and end one year later. This change will allow us to better serve undergraduates and allow them to receive their benefits year-round.

Again, on behalf of the ACS Undergraduate Programs staff, I would like extend a warm welcome to you — and an invitation to let us help you and your chapter make 2006-2007 your best year ever as Student Affiliates! iC



Andrea T. Bennett is the senior program manager for Undergraduate Programs at ACS.

As you can see, this feature has a new look! We love to share what's going on with SAACS chapters … and this new combined Spotlight is where we'll highlight the achievements and insights of both chapters and their advisors, providing a more comprehensive overview. As always, in Chemistry *will include questions and answers designed to inform and inspire chapters as you plan and execute your activities.*
If your chapter would like to be featured in the Chapter Spotlight, please contact Alicia J. Chambers at 800-227-5558, ext. 6716 or email a_chambers@acs.org.

DePauw University
Greencastle, IN

Chapter president: Samuel Rund
Institution environment/ composition: Small, rural, private, 4-year institution
Number of chapter members: 35
Number of ACS Student Affiliates: 9

Q What is your most successful recruiting event/method?
A Mouths! Word of mouth, usually about liquid nitrogen ice cream, is definitely our biggest draw. When people hear about our outreach activities and the fun we have with the kids, they want to sign up, too.

Q What is your most successful chapter activity?
A Halloween at the Putnam County Library. Every year, businesses and institutions all over our small town open their doors for a special, safe Halloween. We set up inside the local library, preparing hundreds of servings of liquid nitrogen ice cream, and helping kids to make countless batches of slime.

Q Does your chapter collaborate with other campus organizations?
A Yes! It has been a very exciting year, as other groups are asking for our help. In the past, we primarily worked only with other science clubs, such as the Geology Club and the Society of Biologists. This year, we were approached by, and did events with, College Mentors for Kids, Relay for Life (cancer research), and the Resident Student Association.

Q How often does your chapter meet?
A We have chapter business meetings once a month, and do outreach events for a local elementary school and in the community about three times a month.

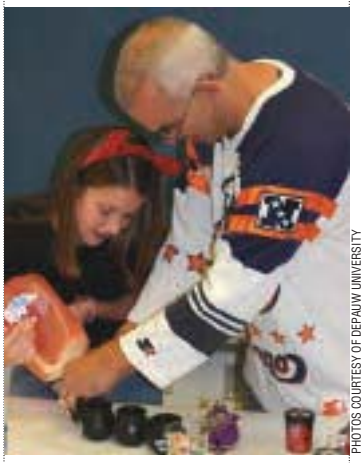
Halloween at the Putnam County Library.

Faculty Advisor
David Roberts – 7 years

Q How did you become a faculty advisor?
A It really came from the students. DePauw had a chemistry club years before I arrived on campus that had, for lack of a better word, "dissolved." I suggested to the students that we should get it running again, and before I knew it, we had a good group that went through all the steps needed to re-start the club. Being a part-time faculty member, I had a little more time than many of my colleagues, so I was chosen to be the advisor.

Q What is your role as a faculty advisor?
A Our club focuses highly on outreach, bringing science to the kids. My main role is to serve as an ongoing point of contact between the members (who change from year to year) and the local schools, libraries, etc. for whom we do our outreach activities.

Q What challenges have you faced in your position?
A The biggest challenge all chapter advisors have is simply getting all the students together and arranging times for outreach events. Planning trips is very difficult; we don't do them very often, simply due to logistics. We plan outreach events based first on the local schools' availability, and then the availability of the students.



PHOTOS COURTESY OF DEPAUW UNIVERSITY

Faculty Advisor David Roberts helps make treats!

Q What has been the most rewarding aspect of your service as a faculty advisor?
A I really enjoy watching the college students light up when they are helping these young children. Our outreach focuses on K–2 (soon to expand to K–5), as our school system doesn't provide a lot of science experiences for those ages. We do hands-on demos, ensuring that all kids are actually doing some sort of experiment (rather than just sitting and watching). In addition to having fun, the DePauw students see how important it is to be community members and be involved in local education.

Q What advice can you offer those new to the advisor position?
A My best advice would be to start slow and build. When we started, we did just a few outreach events. Now, as the club has become better known within the community, we have more than doubled the number of events we do per semester. Every year we add at least one event to our calendar — which sounds small, but is actually a good way to grow.

Also important: don't be exclusive. Our club is open to the entire campus. We often have majors in other sciences, education, English, and the arts who help us perform demos with children. Good demos are very easy to do, and simply require somebody being there to monitor the children while they learn. People in other disciplines often bring something to the experiment that I'd never thought about. Lastly, remember to have fun. It truly is a great, rewarding experience.

Did you know?

The original charter of the DePauw University SAACS Chapter is signed by Linus Pauling, who was president of the ACS in 1949 when the chapter was founded. Pauling, one of the most highly respected chemists of the twentieth century, received the Nobel Prize in chemistry in 1954 for his work on the nature of the chemical bond, and the Nobel Peace Prize in 1962 for his campaign against above-ground nuclear testing.

Canisius College
Buffalo, NY

Chapter president: Matthew Waitner
Institutional environment/ composition: Small, urban, private, 4-year institution
Number of chapter members: 35
Number of ACS Student Affiliates: 8

Q How do you recruit and retain members?
A Officers visit each of the general and organic chemistry classes to announce the first meeting and explain that all students with an interest in chemistry are welcome, regardless of major. To stimulate enthusiasm for the year ahead, we hand out a calendar of events (prepared over the summer by the officers) at the first meeting. Leadership and organizational roles are delegated to members other than the officers, particularly underclassmen, to help ensure that they will be prepared to lead the club in the future. When planning events, we take care to ensure that there is a balance of social, professional, and service activities to successfully carry out the mission of the club while maintaining active membership and interest.

Q What is your most popular chapter activity?
A The activity that attracted the most enthusiasm (and also provided the club with a great number of volunteers) was an on-campus science night held during National Chemistry Week, in conjunction with the school's Office of Campus Programming and Leadership Development. Approximately 150 commuter and resident students of all majors stopped by to play 'Element Bingo,' win prizes, make slime, decorate mole pencils, and watch as we made liquid nitrogen ice cream (and taste the end results!).

Q Does your chapter attend ACS meetings?
A Members of our SA ACS chapter attend and present research annually at the spring ACS national meeting. In Atlanta in March 2006, four of our members presented research posters, and our club was represented at the Successful Student Affiliates Chapters poster session during SciMix.


Participants in the Great Lakes Beach Sweep in September 2005.

Q How often does your chapter meet?
A Club officers meet weekly, and general body meetings are held every three weeks.

Q What methods of communication are used to inform chapter members of chapter activities?
A Our main communication tool is e-mail, which is effective for informing members of meetings and events, as well as organizing volunteers for demos and other activities. Posters placed throughout the chemistry department and on a bulletin board near the chemistry office inform members of events happening in the near future. The club also has a website (www.canisius.edu/~ACS) with dates of upcoming events, contact information for the club and the officers, and pictures from past events.

Q What has been your most successful fundraiser activity? What others do you sponsor?
A For the 2005-2006 school year, our most successful fundraiser was a new idea suggested by one of our senior members. We made and sold chocolate roses for Valentine's Day, earning nearly $800 for club activities. Orders were taken outside of the dining hall at meal times. Then we melted and molded the chocolate, wrapped and decorated the roses, and delivered them to various customers around campus. Another fundraiser that has served the club well for a number of years is the Poinsettia Sale around the holidays, which brought in approximately $250 this year. Our success is also due to funding and support from both the local Western New York ACS Section and the college's Student Senate.

Did you know?
The Canisius College SAACS Chapter participated in the Great Lakes Beach Sweep, an event to clean up the area around Lake Erie.


PHOTOS COURTESY OF CANISIUS COLLEGE
Students at a general meeting in spring 2006.

Faculty Advisor
Mary O'Sullivan – 1 year (plus seven years at another college)

Q How did you become a faculty advisor?
A At both Canisius and the college where I taught previously, I was asked by students to be their advisor, and also encouraged by my department chairs to volunteer. I became an advisor because I enjoy working with students on projects outside of the classroom and research labs. Also, I enjoy helping students develop the organizational, leadership, and team-working skills needed to keep the chapter operational and fun, and to maintain high levels of enthusiasm in members.

Q What is your role as a faculty advisor?
A The members of the executive committee of the chapter and I meet at least once each week. My main role is to make suggestions about possible events and activities, including how to organize them, people to contact, and strategies for interacting with other student members and faculty, etc. Also, I advise the students on how to schedule and manage their time and resources so that chapter activities continue to be fun and well organized.

Q What challenges have you faced in your position?
A Very few!! Sometimes officers feel over-worked and under-appreciated by the end of the school year, especially closer to exam week. To help alleviate this, I suggest that they not schedule any major events in the final couple of weeks of the semester. (However, we always organize parties with students, faculty, and alumni at the end of each semester and these parties are very popular.)

Q What has been the most rewarding aspect of your service as a faculty advisor?
A I find it most rewarding to help students work together to organize and hold successful events. I especially enjoy events which result in the students feeling proud of their efforts and accomplishments. Also, it's been rewarding to help students interact positively with professors and other chemists, and to observe the amount of professional confidence they've developed.

Q What advice can you offer those new to the advisor position?
A Keep your interaction with the students fun. Remember that it is the students' organization, and that your role as an advisor is to facilitate and encourage. At the start of the school year, suggest a range of appropriate events or activities and listen carefully to suggestions from students. Help the students choose a selection of possible activities that they are really enthusiastic about. Then create a schedule for the entire year, being cognizant of "distractions" like exam weeks and spring break.

Tapping the Enthusiasm

Creating an Interactive Science Program

By Zinat Ismael, Zoe Loomis, and Cassandra Vogel

PHOTOS COURTESY OF UNIVERSITY OF COLORADO AT DENVER

CHEMISTRY IS EVERYwhere. This fact attracts many students to the chemistry program at the University of Colorado at Denver and Health Sciences Center (UCDHSC), a busy commuter campus in downtown Denver with approximately 12,000 students. Because many students have full-time jobs and families, and take at least 12 credit hours, it is remarkable how many find the time and energy to share their passion for science with others.

This passion encouraged the development of a chemistry club where students meet to discuss scientific concepts and share their enthusiasm for the subject with others in the community. The same passion also led our chemistry club to decide to become an ACS Student Affiliates chapter.

The Beginning of a Good Thing

As do many other Student Affiliates chapters, we began to perform science demonstrations at local schools and libraries in order to create interest in and understanding about scientific concepts.

Performing science demonstrations is fun, and it's a great way to initiate thought and discussion about science. At the end of every demonstration, the students would bombard our members with questions and theories — when there was too little time to provide good answers. As a result, we would leave these events excited by the enthusiasm we had generated, but with a twinge of guilt knowing that we had not, and might never, be able to answer all their questions. When we considered these sentiments as well as low standardized test scores in the areas of science and math, we decided to develop an ongoing science program that would foster an interest in, and provide a basic understanding of, scientific concepts.

RISE Arises

After considering the important aspects of a successful science program, UCDHSC SAACS launched the Resources for Interactive Science Education (RISE) program. In developing the program, we considered the Denver Schools' current curriculum, as well as various learning and teaching styles. Most importantly, the program needed to allow our members to continuously interact with the students in an ongoing relationship, answering their questions and nurturing their ideas.

Hands-on activities are an integral part of RISE. Such activities require students to contemplate concepts learned and apply them using real materials. This process aids in understanding and retaining abstract scientific concepts.

Flashy, fun, and eye-catching experiments at the beginning of the program grasp the interest and attention of the students. At the end of each program, fun activity sheets and summaries of experiments are given to the students to test their knowledge of the subject matter and improve retention.

With a Community Interaction Student Affiliates Grant from the American Chemical Society, our club turned the idea of an interactive science program into a reality. In September 2005, UCDHSC SAACS performed the first RISE program at the Bronco's Boys and Girls Club of America (BGCA) in Montebello, Colorado. The program was a huge success! The students were excited, enthusiastic, and receptive to everything we taught them. The best aspect of the program came at the end — when we said, "See you next time!"

Later, we held monthly RISE demonstrations at the BGCA, which allowed us to incorporate a specific theme or topic to help students relate similar concepts to one another. Little did we know, this was merely the beginning!

RISE Expands

The RISE program was such a sensation with students at BGCA that the teachers at Roy McGlone Elementary School (located across the street) soon requested that we conduct our program

for their fourth-grade classes. In January 2006, we began weekly visits with the McGlone students, in addition to our programs at BGCA. These five hours a month allow our group to convey the concepts and importance of science to over 150 students.

Through RISE, we are trying to help students in as many ways as possible. We recently developed a "Kids Chemistry Corner" page on our website (located at http://thunder1.cudenver.edu/chemclub/) that allows students to e-mail us with questions and use a number of resources. The page contains a manual of chemistry experiments and demonstrations that can be used for science fair projects or for other scientific exploration. Handouts and activity sheets for all of our programs are available on this site, as well as links to the ACS Kids Page (chemistry.org/kids) and other kid-oriented science sites.

The RISE program continues to expand, as McGlone Elementary has recently asked us to conduct our program for its upcoming fourth-graders. Likewise, another elementary school and a high school have requested our services starting next fall. Expanding RISE in these ways requires a time commitment and a steady source of funding, both of which we are currently seeking. Without donations, student participation, and faculty support, we could not accomplish our mission: Sparking and encouraging an interest in science. IC

Zinat Ismael is a senior at UCDHSC and SAACS chapter president. **Zoe Loomis** is a junior at UCDHSC and vice president of the SAACS chapter. **Cassandra Vogel** served as director of the RISE program for the UCDHSC SAACS chapter before graduating in May of 2006.

Tips for Creating an Interactive Science Program

A science program needs access to students!!! We have discovered that talking with teachers has brought us to more schools than speaking with principals or administrators. Libraries, boys and girls clubs, and other youth organizations almost always welcome a fun and educational program.

Once you have a group of students, there are three essential elements for a successful science program:

- Volunteers
- Funding
- Science demonstrations

Volunteers are your most important asset, because they organize, plan, and perform demonstrations. On our commuter campus, finding volunteers has been our greatest struggle; therefore, we have developed some creative ways of recruiting them, including:

- Holding a semester kick-off party. We have free food, demonstrations, and a good time!
- Recruiting campaigns held at the beginning of each semester. We visit each science class and pass out flyers and stickers with our club information.
- Arranging with professors in chemistry or science courses to offer extra credit for participation. Usually 10 points are awarded for attending a demonstration with a maximum of 20-30 points available.
- Instating courses that require involvement in RISE. Chemistry majors and teaching assistants will be required to take a 1-credit-hour course on teaching and demonstrating science. (This typically requires the commitment of a department and approval from a curriculum review committee at the institution.)

To pay for chemicals, equipment, and supplies, we raise funds in the following ways:

- Holding bake-sales and similar events.
- Applying for grants, such as the CISA grant and the Anschutz Family Foundation grant.
- Asking large companies for donations. For example, Sigma donated $250.00!

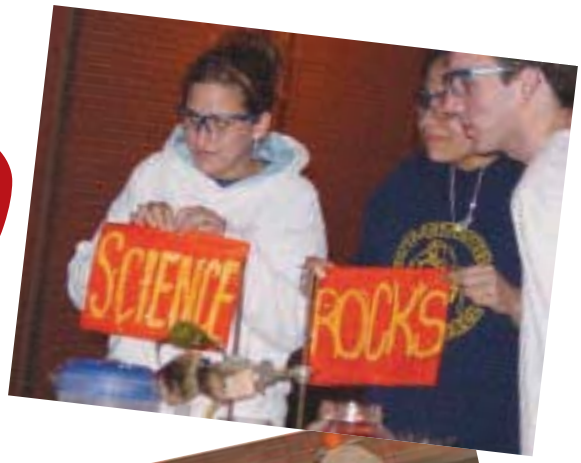
Finding science demonstrations is relatively easy once you know which types of demonstrations you want. Our club investigated current school curriculums and standardized tests to identify which concepts we wanted to teach, and then grouped these into themes for each month. After you've chosen themes for your program:

- Assign volunteers to find demonstrations for each theme. We always use at least one flashy experiment and two hands-on experiments. These are easily found on the Internet or in science teaching guides.
- Test your demonstrations!!!! Make sure they work and that they convey the concepts you want to teach.
- Assign volunteers to summarize each demonstration in a take-home handout. We include background information, a description of the procedure, a scientific explanation, and a picture of each experiment in our handouts.

Be sure to express thanks and appreciation at the end of each session. Acknowledging the efforts and contributions of all those involved can help maintain their enthusiasm.

Spreading the Joy of Chemistry

An Innovative Activity Grant Project



By Thomas Krupa and Ping Y. Furlan

ALTHOUGH CHEMISTRY demonstrations and hands-on activities are not new in themselves, they certainly offer an excellent way to interact with the community and spark interest in science and chemistry. Since 2001, our small Student Affiliates chapter at the University of Pittsburgh-Titusville Campus (UPT) has found creative ways to engage people in such activities with funding from the ACS Student Affiliates Program's Innovative Activities Grants program (IAG).

The funds have allowed us to celebrate National Chemistry Week (NCW) and sponsor a "Science Rocks!" show, career fairs, and hands-on workshops highlighting chemistry's important role in helping people live better, healthier, and happier. Our programs have been extremely effective at bringing the NCW message to people in our communities and providing our members with additional chemical experiences and valuable skills as leaders, team players, and future mentors.

Over the 2005-2006 school year, we used our IAG funds to carry out a project we called "Spreading the Joy of Chemistry." The objectives of the project included developing a 2005 NCW outreach program with innovative materials consisting of new demonstrations, hands-on workshops, and 'walk-around' chemistry characters that supported the NCW theme, "The Joy of Toys."

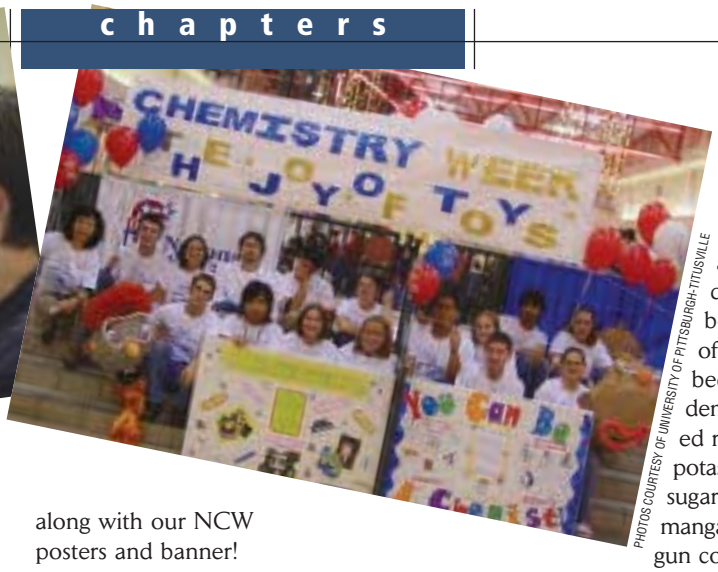
Introducing Milli, Mole, and the Chemist

To increase interest in our events, we created costumes for walk-around characters who would get the crowd into the spirit of chemistry. We designed two of our characters as animals, and one as a human. For the animals, we chose the concept of a mole — one of chemistry's principal units and well-known to anyone who has taken a chemistry course. We also chose the mole because we knew there was an abundance of images from ACS and other sources that we could use for Mole Day events.

Next, with the valuable skills and guidance of a local puppet and costume expert, Charlotte Randall, and help from Cynthia Andes, a professor of humanities and English at UPT, we created a concept for the first costume: Dr. Avagadro Mole. He was to be brightly colored and wild-looking — a funny version of the 'mad scientist' stereotype — to encourage the joy of chemistry. With his bright red hair, tie-dyed lab coat, and orange tie, he certainly fit the role.

We also designed a costume for Safety Milli Mole, a safety-conscious and less wild-looking female mole. Then we added a third character who could both talk to the crowd and guide the moles (whose costumes hindered the abilities to speak and see!). This guide wore a white lab coat with the phrase, "A mole is a chemist's best friend," across the front.

With the help of Randall and the use of her workshop and materials, construc-



PHOTOS COURTESY OF UNIVERSITY OF PITTSBURGH-TITUSVILLE

tion was fairly easy. We cut the moles' outfits from foam sheets, and glued together the pieces with contact cement. Once the rough shape was made, we sprayed the foam with brown and gray texture paint for color. We made their eyes and ears from smaller pieces of foam and attached them with a hot glue gun, and constructed their goggles from overhead transparency film and foam tube frames. Construction took less than two weeks, with club members working in groups of two or three for several hours each day.

The completed costumes were a hit with the members of the club, as well as the audiences of our demonstrations. One student enjoyed the Dr. Avogadro Mole costume so much that we let him wear it on Halloween night! We used the costumes at all of our chemistry demonstrations in schools and other public locations over the year, as well as campus-only events. They held up well and we plan to use them in future events.

Celebrating NCW

Each year, about 20 chapter members spend a Saturday at Erie Millcreek Mall celebrating NCW with the public. This year, we also participated in the Erie Children's Science Museum Day program. These events are the largest NCW annual outreach programs of the Erie Section of the ACS, and all six local ACS Student Affiliates chapters participate.

During the events, Student Affiliates worked with hundreds of individuals of all ages — including the mall patrons and the young museum visitors — on the chemistry activities, and helped them discover the chemistry behind various fun toys. Altogether, we used about 20 hands-on activities for our 2005 programs. For the second year in a row, the mall program was covered on a local TV news program, which this year featured our new walk-around characters along with our NCW posters and banner!

Reaching Out to Local Schools

We also held a major outreach event right in our own science building. About five weeks before the event, we sent out invitations to the local school principals and invited their teachers and students to perform and observe between 30 and 40 demonstrations and experiments set up in two labs. We also recruited volunteers to staff three out of six shifts that we offered (the other three shifts were staffed by students taking chemistry classes). Three of the shifts were in the morning and three in the afternoon, with about 15-20 volunteers present during each. Volunteers prepared by spending about an hour learning all the experiments.

On the day of the event, Safety Milli and Dr. Avogadro Mole greeted our young visitors at the entrance of the science building. Our volunteers then worked with a series of groups of 25 elementary or middle school students on two or three experiments. Each student group spent about 30 minutes visiting each station in the labs. Through these events, we reached 160 elementary school students in grades 1–5 and 180 middle school students and their teachers.

Doing Chemistry in the Dark

For our year-end event, our chapter held an outdoor program that was open to students as well as the community. It featured demonstrations involving sound, such as singing tubes and bottled music, and color change such as indicator solutions and goldenrod paper. We also conducted liquid nitrogen demonstrations, including a frozen rubber hose, and shattering flowers and lettuce.

As the sun set and our exothermic demonstrations began, the meaning of the show's name became clear. These demonstrations included reactions such as potassium chlorate and sugar, potassium permanganate and glycerin, gun cotton, thermite reaction, flame colors of metal salts, and the dragon's flare (lycopodium powder). Next we performed a demonstration of chemiluminescence. Dr. Avogadro Mole also made an appearance to entertain the crowd with his antics and hand out free stickers and toys.

We promoted the show in the schools with flyers and handouts. We had a great turnout, and the audience was mainly non-student guests, such as local school children and their families.

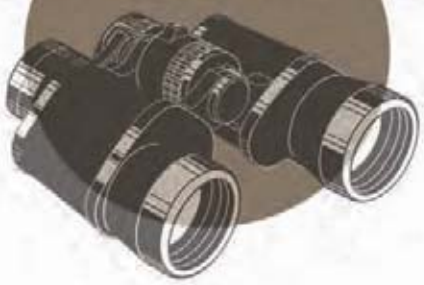
All of these events contributed to our continuing effort to promote science and spread the joy of chemistry among students and the community. These programs also allowed our members to extend and apply their learning beyond the conventional classroom.

What's more, our participating members gained valuable teaching experience, and learned much more about science and chemistry than can be addressed in regular classroom or lab settings. They also practiced expressing chemistry ideas to a general audience in a clear, easy-to-understand way … that was at the same time fun and exciting!

Our officers gained skills in leadership and in planning, organizing, and carrying out events. The enthusiastic participation of our chapter members — and of our audiences — in all of these events attests to the benefits of these programs.

Thomas Krupa was the secretary of the UPT SAACS chapter for the 2005-06 academic year. **Ping Y. Furlan**, an associate professor of chemistry at UPT, has been the advisor of the UPT SAACS chapter since its inception.

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 their annual 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!

National Chemistry Week/Mole Day/Earth Day

Carroll College, Waukesha, WI

The SAACS chapter at Carroll College created a game called Atomologyopoly, fashioned after Monopoly.

How long did it take to plan the activity and what was involved?

Three weeks of planning went into the design of the game board, finding information, labels, printing/cutting the cards, the box, and the game pieces. We adapted each square on the board to have a chemistry theme. We created original game pieces and developed the property cards. A board design was created using Adobe Illustrator and printed as a large decal, giving the board a more finished and professional look. Several small test sessions were conducted.

What planning resources did you use?

We found the information for the property cards at the web site http://www.chemicalelements.com. Card definitions came from the book *Chemistry*, eighth edition by Raymond Chang.

How many SA participated?

Two Student Affiliates, Brad Stockel and Kristina Blanke, and another student, Amy Maile, developed the game.

How many people attended the event?

Atomologyopoly debuted at the Chemistry Club Christmas party, attended by two professors and approximately 15 students.

What was the age range of the audience?

The game was created to teach chemistry to students learning at a high school level. Anyone interested in learning basic chemistry could play and learn from players with any level of previous chemistry experience.

How long did it last?

Most games are started with a time limit, but with seven properties for each element, the game could continue for any amount of time.

What safety equipment was required?

No safety equipment was necessary. However, lab coats and safety goggles enhanced the experience!

For more information, contact Dr. Michael Schuder, faculty advisor, at mschuder@cc.edu.

Speakers/Tour/Field Trips

University of Hawaii-Manoa

The SAACS chapter members at the University of Hawaii-Manoa hosted Careers in Chemistry.

How long did it take to plan the activity and what was involved?

The event took approximately two weeks to plan. Karl Seff, a faculty member, had made the presentation several times in the past. After choosing a date that worked for both him and the club members, we prepared flyers to hang up in the Chemistry Department. At the event, we served refreshments.

What planning resources did you use?

Since the slide show was already prepared, all we needed to do was to book the room and arrange for the projection equipment.

How many SA participated?

Two Student Affiliates participated in the planning, and three Student Affiliates attended the event.

How many people attended the event?

A total of eight people attended the event.

What was the age range of the audience?

Participants ranged in age from 16 to 21 years, including a high school student.

How long did it last?

The presentation lasted approximately one hour.

What safety equipment was required?

No safety equipment was required.

For more information, contact Janice Smith, faculty advisor, at jgsmith@gold.chem.hawaii.edu. IC

ROBIN Y. LINDSEY is a lead program assistant in the ACS Education Division.

Tips for Pursuing Graduate Fellowships

By Earnestine Psalmonds

WITH THE AVAILABILITY OF tuition waivers and stipends from graduate chemistry programs and advisors, why pursue a graduate fellowship? It may take some effort, but if you are successful, you will be able to develop a personal professional development plan — and begin moving toward your career goal.

Fellowships are a viable option for financing graduate education. A fellowship differs from other forms of graduate student support in that it enables the recipient to pursue the area of study of the greatest personal interest.

There are numerous fellowship programs offered through federal agencies, foundations, industries, universities, and other private sources. Since they are competitive and restrictive awards, you should look into the details before applying.

Some fellowships target specific disciplines, or support only master's or doctoral education, while others allow students to complete both degrees. Eligibility requirements differ also. Some are open to graduating seniors; others are open to both graduating seniors and first-year graduate students.

Fellowships may be flexible as well. For example, the National Science Foundation (NSF) Graduate Research Fellowship allows a student to attend any accredited institution in the United States or abroad. NSF fellows are funded for three years, but recipients are given five years to use the funding, as well as tenure deferral options so that they can take advantage of alternative financing, such as other fellowship offers.

How Can You Learn More?

The Internet is a convenient tool to find information about graduate fellowships. Locating appropriate programs on the websites of federal agencies and foundations could be somewhat challenging if you are unfamiliar with the missions of these organizations.

University websites, on the other hand, list deadlines and other information about fellowship programs and are often designed specifically for students. In fact, many provide tools and publicize student workshops about preparing fellowship applications. In addition, some fellowship/scholarship support offices provide direct assistance to students in preparing personal essays, selecting references, and interpreting fellowship program guidelines.

What's in a Fellowship Application?

Most fellowship applications for competitive programs require students to present a holistic view of their character, technical strengths, and academic capabilities. Each section of the application asks for specific information that will be used to evaluate an applicant according to the purpose of the program. Therefore, be sure to follow the application instructions, and be attentive to context as well as content. Fellowship applications use the following basic format:

- **Personal Demographics and Profile.** This section includes personal data, current and proposed graduate institution, degrees completed, work experience, honors and awards, and GRE scores. Typically you are asked to furnish official transcripts from universities attended.
- **Personal Essay.** This is your opportunity to display those attributes that will satisfy fellowship program requirements, as well as those personal qualities that may distinguish you from others. The latter could include career aspirations, leadership potential, evidence of personal perseverance, and experiences that have influenced your desire to pursue graduate study.
- **Previous Research Experience.** Reviewers will use this information to assess your readiness to engage in graduate level research. Here you describe experiences such as undergraduate research programs, summer internships, and other academic or job-related research activities. You also may include publications or presentations at national or regional professional meetings. Reviewers consider the purpose of the research, the extent to which your work was done independently or as part of a team, and what you learned from the research.
- **Proposed Research Plan.** This section asks for a comprehensive prospectus that demonstrates your understanding of research design and methodology. Reviewers look for evidence of your potential to contribute significantly to research, education, and innovations in science and engineering.
- **Reference Letters.** Ask for these from your academic and research advisors, mentors, supervisors, and others who can attest to your qualifications. The letters should respond to the program's evaluation criteria.

How Can You Optimize Your Chances?

- Start early and meet the deadline. Review the program solicitation carefully and all other relevant documents, such as FAQs. Start months before the deadline organizing the information to complete the application and cultivate references. Request transcripts, GRE scores, and other requirements well in advance.
- Prepare substantive, responsive, informative, and honest personal essays. Build on your strengths. Reflect your understanding of the program's expectations, and present a compelling argument as to why you would be a solid investment.
- Choose and "instruct" your references carefully. Select persons who can validate your application. Give them your résumé, the program announcement, and other information to assist them. Remember that these same persons are asked to write reference letters for other students as well, so give them lots of advance notice.
- Prepare a well-written and well-organized application that complies with the instructions and responds to program review criteria. Avoid submitting extraneous information. Applications that can be evaluated expeditiously are more likely to be recommended for funding.

Throughout the process, be sure to take advantage of formal and informal networks. Seek advice from mentors, research advisors, previous fellowship recipients, and campus fellowship coordinators. They can help you identify programs and create a competitive application. And once you receive a fellowship, they can help you shape and carry out your plan for graduate studies. Good luck! IC

Earnestine Psalmonds is director of the Graduate Research Fellowship Program at the National Science Foundation.

Preparing to Make a Difference

By Jodi L. Wesemann and Adam M. Boyd

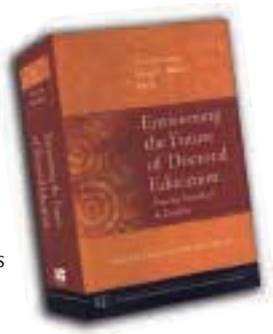
A chemistry graduate student starts her week in the lab, running some reactions she's been working on with her advisor. She stays late to clean glassware before heading home to take notes on a chapter for her synthesis class and plan a lecture for the section of organic chemistry she's teaching.

For most graduate students, this schedule is fairly typical. The next day, however, this student attends a lecture of pedagogical approaches in chemistry before reporting to her educational mentor regarding the educational research project they've been developing…

This is just one example of a graduate student following a passion and complementing traditional graduate studies. Pursuing activities focused on education, other sciences, public policy, or other interests can add both depth and breadth to your education, and will help you develop the professional skills essential for success. It will also help you prepare to be a "steward of chemistry."

According to the Carnegie Initiative on the Doctorate (CID), the goal of doctoral education, be it in chemistry or any other field, is to train students to become effective stewards of the discipline. In the book entitled *Envisioning the Future of Doctoral Education*, Chris M. Golde outlines the three basic competencies or abilities that all "stewards" should exhibit: generating new knowledge and defending ideas, conserving important ideas of the past, and transforming knowledge that has been generated and conserved by explaining and connecting it with ideas from other fields.

PHOTOS.COM



This task of transformation occupies a special position, bringing into focus the complementary abilities of generation and conservation. Transformation, in plainest terms, is teaching. In *Envisioning*, Golde writes, "Those who are expert practitioners of their field will be called upon to teach, regardless of their work setting. Whether one is a classroom teacher or is working in a government laboratory, industrial setting, or policy arena, the steward must be able to convey information clearly." The audience may be the chemistry community, students, or society at large.

You can prepare independently to address such challenges, but it is much easier to do so within a research group — or preferably, as part of a chemistry program. Educators in various departments across the country, including those selected to participate in CID, are working to expand degree options, institute flexible curricular requirements, offer supplemental workshops, and integrate the development of professional skills into graduate programs.

With a fairly broad spectrum of choices, how should you narrow down your options? One of the best ways is to look for the program that seems most aligned with your interests and capable of fostering your professional growth. The three essays written by chemists in *Envisioning* raise a number of issues to consider as you select a graduate program.

Communicating with the Scientific Community

Nearly all chemistry departments require graduate students to present the results of their research. Don't shy away from the programs that require a variety of presentations. One of the essayists, Ronald Breslow of Columbia University, recommends that graduate students deliver several public seminars, regular oral research reports, "literature" talks, and research proposals — along with seeking out thoughtful and timely critiques. You should also ask for guidance and feedback as you develop your presentations, particularly for the public seminars. "The student should have a good deal of support from the department, with detailed and helpful feedback on draft proposals and presentations, as well as opportunities to rehearse in front of students and faculty, including practice fielding questions from the audience."

Another of the essayists, Angelica M. Stacy of the University of California-Berkeley, notes, "Because cutting-edge research requires cooperation — a team of people pooling their extensive knowledge of many disciplines — it also calls for new ways of negotiating, working with others, and communicating." Working on interdisciplinary projects under the guidance of several advisors can help you gain such skills.

Communicating with Students

Although only about one-third of Ph.D. chemists work in academia, enhancing their preparation is seen as essential to the future of the discipline. Another essayist, the University of Washington's Alvin Kwiram, drives the point home through an analogy: "There is today a serious mismatch between the nature and purpose of a doctoral degree and the demands and expectations of the academy — a significant employer of those with a Ph.D. degree. Imagine spending years training an athlete to learn the intricacies of playing football, and then once he finishes playing college ball, assuming that because he is a well-trained athlete he can immediately be appointed head coach. This is essentially what we do in the academy," he writes.

"Whether one is a classroom teacher or is working in a government laboratory, industrial setting, or policy arena, the steward must be able to convey information clearly."

If you are interested in an academic position, seek out programs designed to prepare you for the many responsibilities associated with such a career. Many universities sponsor Preparing Future Faculty programs to aid graduate students in their quest to become effective educators. Several universities have programs in chemical education, such as that of the University of Michigan (see page 12). Projects such as those funded by the National Science Foundation GK-12 Program (see page 14) can also provide opportunities to gain experience while enhancing science education in elementary and secondary schools.

Communicating with Society at Large

Being able to describe your work to non-scientists is an essential skill for both your social and professional life. Breslow reminds readers of the "Grand Challenges" identified in the National Research Council report, "Beyond the Molecular Frontier: Challenges for Chemistry and Chemical Engineering." One of these challenges is "communicating effectively to the general public the contributions that chemistry and chemical engineering make to society." Several departments require that students include in their theses a summary in laymen's terms — a practice that Breslow advocates.

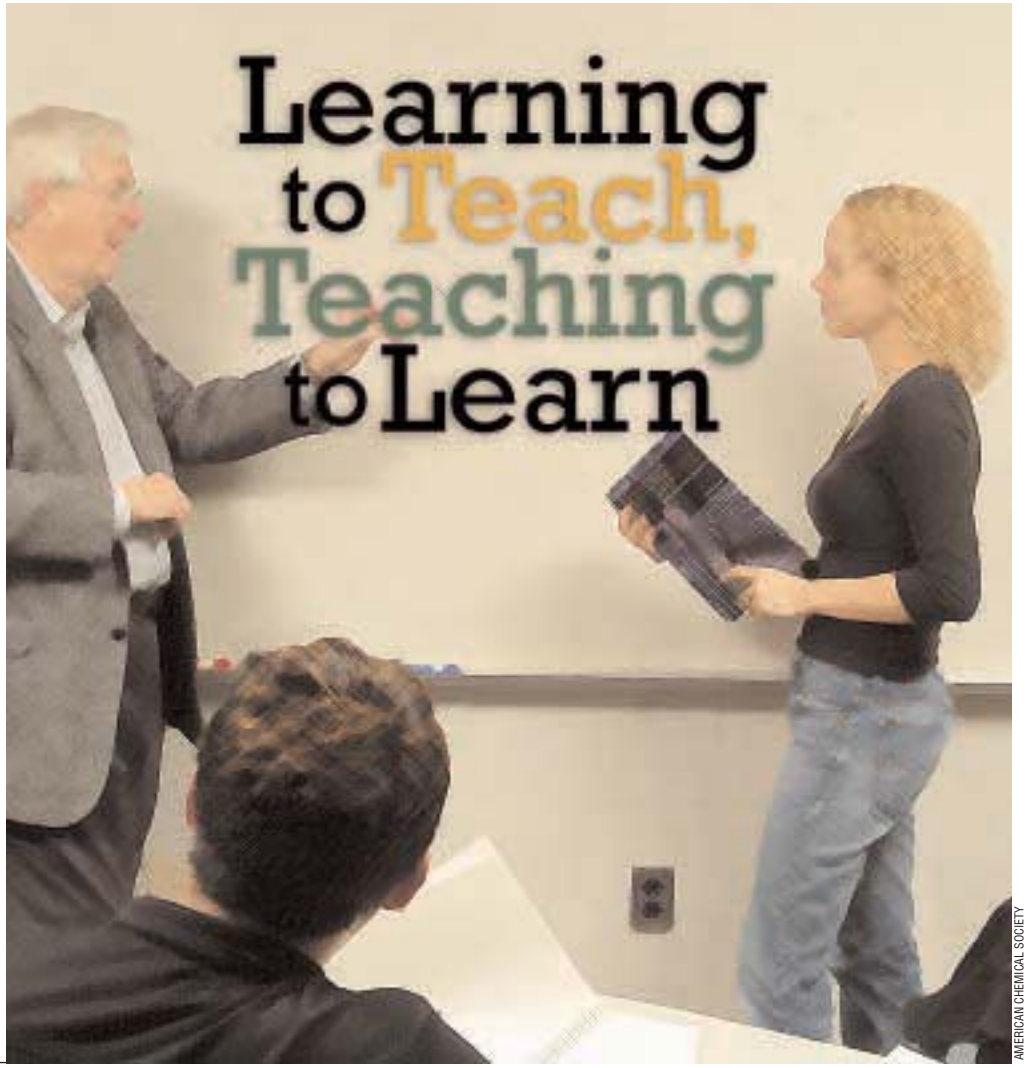
Becoming a Leader

"To be a Ph.D.-level chemist today is to be a new type of leader, colleague, researcher, and teacher," Stacy notes. This requires a depth and breadth of expertise, and a range of skills including communication.

Stacy also writes, "We are at a crossroads, where different paths may lead to different consequences of chemistry as a discipline. We need to choose, strategically, a path that will allow chemists and chemistry to flourish, and we need new kinds of leaders to shape this path and guide us along it." Look for programs that encourage good questions and creativity. Pursue opportunities to build on your interests. Identify supportive advisors and mentors. Graduate school should not only prepare, but inspire you to be a new leader — a steward of chemistry. IC

JODI L. WESEMANN is editor of **in Chemistry** and assistant director for higher education at ACS. ADAM M. BOYD is associate editor of **in Chemistry** and an education associate in the ACS Undergraduate Programs Office.

Learning to Teach, Teaching to Learn



AMERICAN CHEMICAL SOCIETY

By Adam M. Boyd

GIVEN THE INTEREST IN IMPROVING the quality of higher education, a number of chemistry departments across the country have established programs to introduce graduate students to the roles and responsibilities of being a faculty member. Chemical Science at the Interface of Education (CSIE) at the University of Michigan (U-M) is an example of such a program.

John Henssler is one of the students at U-M who is pursuing his Ph.D. in chemistry while paying special attention to the role of instruction. He still manages the normal workload for a Ph.D. candidate — attending classes and performing traditional materials-based research — but his involvement with CSIE allows him to rehearse for his future role as an educator.

CSIE is a voluntary program offered to all chemistry graduate students at U-M. The program allows students to get involved with education through student teaching, attending seminars on chemical education, and participating in educational research projects that can become part of their doctoral theses. Because participation in the program does not alter the requirements for a Ph.D. in chemistry at U-M, and does not increase the time needed to earn the degree, many students find the optional program helpful.

Inquiry at a Deeper Level

Henssler's affiliation with CSIE started at the beginning of his graduate education, when he accepted a CSIE fellowship in the form of a Graduate Assistance in Areas of National Need grant. Starting in the spring of 2005, Henssler and four other first-year chemistry graduate students were fully funded for one year. In exchange, they were required to take an additional course from the education department or related area, and also to participate in a one-credit weekly discussion led by Brian Coppola — a chemistry professor at U-M and the program director for CSIE. Discussion topics included educational literature, teaching philosophies, designing education experiments, and curriculum development.

During his first year, Henssler developed an educational research project to improve a first semester honors organic laboratory and to document the effectiveness of his proposed changes. Together with his mentor, he developed educational models and incorporated them into a new course syllabus and lab manual. Based on collected data and student reviews, the changes succeeded in improving the course which, with Henssler's alterations, will be offered again in the future.

The ability to engage in educational research while simultaneously conducting traditional materials research with a separate advisor has been helpful to Henssler. It's also helped him understand how he can embrace the role of an educator with a research focus.

"While having teaching experience before beginning at U-M, I had never been involved in educational research. I have learned a great deal about designing educational research and incorporating it into curriculum development. Often we have a tendency to teach as we have been taught. The CSIE program has introduced me to a wide array of teaching methodologies and has given me tools needed to conduct educational research and develop new teaching methodologies," explains Henssler.

Coppola, who also serves as Henssler's mentor on the project, defines the purpose of the project in simple terms: "Faculty members should be as well prepared to take on the education-related aspects of their jobs as they are for the research-related aspects."

Customizing the Ph.D.

Another CSIE participant, Alan Kiste, is taking a slightly different route. In the lab, you can find Kiste investigating the regiochemistry of 1,3-dipolar cycloadditions or developing new methods of analyzing students' chemistry visualizations, borrowing ideas from the field of verbal discourse analysis. Thanks to the flexibility of the CSIE program, Kiste has chosen to pursue a "student initiated combined degree" in chemistry and education, requiring him to complete all the coursework required of a chemistry Ph.D. and much of that required of a Ph.D. student in education, under the guidance of two co-advisors. However, he adds, he has only one dissertation committee, and one combined set of class requirements, candidacy exam, and dissertation.

COURTESY OF ALAN KISTE

Alan Kiste, U-M Ph.D. candidate.

The result is a "depth in educational history, philosophy, psychology, and quantitative and qualitative research methods that the typical CSIE student probably wouldn't get," explains Kiste.

Kiste started his path to chemical education in 1993 at U-M but left before finishing his degree. His teaching assistant experience cemented his desire to teach chemistry, so he taught high school chemistry for four years. After that time, Kiste realized he wanted to finish his Ph.D. and he returned to U-M, where he received a CSIE fellowship.

Like Henssler, Kiste credits the CSIE program with helping to cultivate skills necessary to prepare for a career in academia. "Probably the most important benefit," explains Kiste, "is simply having a much greater understanding of what being a faculty member is going to be like, and seeing what goes on behind the scenes. I think many graduate students do not get that experience."

Greater Breadth

The CSIE program has other advantages as well. By enabling graduate students from different fields to come together under a common initiative, the CSIE program also lends itself to adding breadth to the doctoral education of each participant.

"Faculty members should be as well prepared to take on the education-related aspects of their jobs as they are for the research-related aspects."

"Most chemistry graduate students have the support of other students in their research group and also students in the particular specialty they're pursuing," explains Kiste. "In CSIE, graduate students from across the department are brought together around a common goal of developing themselves as future faculty members. That means, for example, that organic chemists get to talk frequently with physical chemists with whom they otherwise might rarely interact."

Henssler points out that the rewards for participating in the program are reflexive. "Teaching is best way to learn," he points out, and adds that by learning to become better teachers, participants in the CSIE program simultaneously enhance the depth of their own graduate education.

Getting Started

Students interested in becoming chemistry professors can pursue a range of options. Programs like CSIE offer students opportunities within the research institution. Students in Preparing Future Faculty (PFF) programs often work with faculty at non-Ph.D. granting institutions, gaining an understanding of the different environment and expectations.

"Seek out teaching experiences as early as possible," advises Stacey Buchanan, a former CSIE participant and current professor at Henry Ford Community College. "When applying to graduate school, definitely look for a program like CSIE or some other type of PFF program. Seek opportunities beyond the typical teaching assistantships — especially if you can gain experience in a lecture setting."


COURTESY OF JOHN HENSSLER

John Henssler, U-M Ph.D. candidate.

Kiste also points out the importance of finding an advisor who demonstrates an interest in chemistry education. "Undergraduates [should] talk to potential graduate program advisors about their interest in education. Many may be very open to having their graduate students explore education-related issues. However, some may be hesitant, or even hostile to the idea. If an undergraduate student is quite sure they're interested in chemistry and education, they should make sure that those interests align with potential future graduate advisors." IC

Adam M. Boyd is an associate editor of **in Chemistry** and an education associate in the ACS Undergraduate Programs Office.

ADVANCING HIGH SCHOOL CHEMISTRY

By Adam M. Boyd

FUNDED BY A GRANT FROM THE NATIONAL SCIENCE Foundation, the CUNY GK-12 Fellows Program provides graduate students the chance to work with teachers who are just beginning to teach high school sciences and mathematics at the Advanced Placement (AP) level. In this program, 10 graduate students in the sciences volunteer to serve as instructional fellows, while engaged in traditional research and coursework at the City University of New York (CUNY).

CUNY GK-12 fellows work closely with their cooperating teachers to plan their day-to-day activities, based on both the teachers' and students' needs. Fellows may also assist with setting up labs, grading, and instruction. During the academic year, fellows are required to spend 10 hours per week on in-class instructional activities at their assigned high school and an additional five hours per week on out-of-class preparation activities.

Training

Both teachers and fellows receive training in the form of conferences and seminars, which ground them in teaching skills and practices. Overall, there are 10 days of training for the fellows, beginning with a five-day summer institute on teaching AP courses offered by the College Board. If the teachers involved are teaching their AP class for the first time, they actually attend the class with the fellows with whom they will be working. Later, during a five-day intensive training class organized by the CUNY program, fellows learn pedagogical techniques and strategies for effective teaching.

Mentoring

The program also has intrinsic mentoring. Experienced fellows pair up with first-time participants to hold informal discussions on their classroom approach. These meetings, in addition to monthly program-wide seminars, provide a support system for new fellows.

Impact

The program focuses not only on the graduate students serving as fellows, but also on the high school science programs in which they serve. At the outset of the program in 2003, only three of 28 schools in the Bronx School District offered any AP classes in the sciences. Since then, three additional schools have offered AP courses and several more have expanded their AP offerings as a direct result of the aid provided by the program.

For Nancy Medina, who is currently serving as a fellow for both AP chemistry and AP biology at Clinton High School in the Bronx, the most beneficial aspects of her experience have been learning *how* to teach – and at the same time, learning *from* teaching.

Medina is planning for a career as a high school teacher, and the experience has been invaluable. She's not only had the chance to be mentored by an experienced educator, but has practiced teaching herself, and learned about better ways to reach students.

"The teacher I was working with was great. He teaches high school and college chemistry, so he knows his field very well. I was able to observe how he taught the lessons, what he thought was important, and how he got results from his students. And because I had to prepare a particular section, it helped me sharpen my own chemistry knowledge. I really had to learn it better so I could teach it to children."

Another fellow, Mary Donovan, used the program to test the waters of academia before accepting a fellowship at Queens College. "If I had not been involved in the CUNY Fellows Program, or if I'd had a bad experience, I would never have accepted my position at Queens," says Donovan, whose fellowship requires her to serve as an adjunct professor by teaching four credits per semester in addition to completing her research. "I actually didn't know if teaching was something I wanted to do. However, I had a really positive experience teaching the class and the lab, and felt more confident about pursuing teaching as a career."

Donovan's early involvement with the fellows program consisted of her simply meeting with a teacher to discuss his lesson plans. Later, her participation grew into a much more involved endeavor. Slowly, she started incorporating some of her own ideas about teaching styles and how certain topics should be taught. After a while, she began collaborating with her teacher to develop lesson plans and to incorporate new methods, such as peer-led team learning, into the coursework.

Rising to the unique challenges of teaching in a high school setting, whether it meant finding a way to complete her lab work in an already busy schedule or simply maintaining control of her class, helped Donovan feel increasingly confident that she could tackle other teaching challenges.

With a comment fitting for a program based in New York City, Donovan observes, "If I could make it there, I could make it anywhere." iC

Adam M. Boyd is associate editor of **in Chemistry** and an education associate in the ACS Undergraduate Programs Office.

For more information about the NSF Graduate Teaching Fellows in K-12 Education Program, and a list of institutions with grants, visit www.nsf.gov/funding.

A Classic Resource on Graduate Research... Just a Click Away

By Marta Gmurczyk

WHEN SELECTING A graduate program and research advisor, it is important to consider your options carefully. Along with seeking advice from mentors, faculty, and other students, you can find a wealth of information with just a few quick searches in the *ACS Directory of Graduate Research* (DGR).

The DGR is the most comprehensive source of information on faculty and their research programs in chemistry, chemical engineering, biochemistry, and related chemical sciences in the U.S. and Canada. It lists faculty member biographical information, areas of specialization, titles of all papers published within the last two years, and individual contact information. In total, it contains listings for over 650 academic programs, 10,000 faculty members, and 90,000 publication citations.

Since it was first published in 1953, the frequently-updated DGR has helped generations of undergraduate students select among graduate schools. The 2005 edition was published last November, along with DGRweb, an improved searchable online database that is available free at www.chemistry.org/education/DGRweb. The upgraded interface and functionality of DGRweb allow for many more advanced searches of both faculty and institutions.

Fast Searches, Valuable Insights

On DGRweb 2005, you may search among both faculty and institutions by virtually any field in the DGR. The search feature for faculty includes specific research areas, academic rank, and gender, and the search results provide complete contact information for faculty, including direct links to their e-mail addresses and Web pages. Institutional searches provide all departmental contact information, along with statistical data on the number of students and faculty in the department involved in graduate research.

With DGRweb, it is now much easier to answer the various questions you have about graduate programs. For example, if your undergraduate research focused on molecular spectroscopy, and you would like to continue your graduate studies in this area, you can go to the *Faculty Search* section of the website, type "molecular spectroscopy" in the "specific research" box and within two seconds, you'll pull up a list of 37 faculty members who are dealing with your subdiscipline in their research. With a couple more mouse clicks, you can retrieve more information on the specific research areas of each of these faculty members, along with the titles of all papers published within the last two years, and their contact information, including links to their e-mail addresses and websites.

Or perhaps you are interested in molecular genetics, and want to find the departments that specialize in this area. Just go to the *Institution Search* section and type "molecular genetics" in the "fields of specialization" and almost immediately, you will see a list of nine institutions with programs focused on that field. You'll have instant access and links to all departmental contact information, statistics on faculty and graduate students, and a complete list of faculty active in graduate research.

Want to see whether there have been any changes in the graduate program in a selected department within the last five years? DGRweb can help with this question as well, as it includes access to the complete 1999, 2001, and 2003 DGR databases!

These are just a few examples of situations in which the DGRweb might be helpful to you. Try the DGRweb today and let us know what you think by completing the 60-second survey. Your input will help us improve future editions of the DGRweb.

While surfing the DGRweb, don't forget to bookmark it — because, if graduate school is in your future, it's very likely that you will be coming back for more information! tC

Marta Gmurczyk is a senior education associate in the ACS Office of Professional Training.

Fast Track to Experience!

Preparing for an Industrial Career by Working as a Teaching Assistant

By Rama Konduri

GRADUATE SCHOOL IS NOT ENTIRELY ABOUT MAINtaining a high GPA, acquiring and polishing technical skills, and publishing papers. Being a teaching assistant (TA) in graduate school can supplement your career development in ways that not only help you grow as a scientist, but also improve your marketability — especially in a job market where large numbers of Ph.D. chemists are competing for industrial jobs.

Roles as a graduate TA fall into two broad categories, academic and administrative. In your academic role, you teach or assist in the classroom, conduct labs, lead recitations or discussions, and give assignments. You also grade tests,

ChemJobs A Key Resource

PREPARING FOR A JOB search can be scary, but the ACS Chemjobs Online Career Center (http://chemistry.org/careers) can help with advice, publications, resources, and even access to chemistry career consultants. Online publications for managing an effective job search include:

- Job-Search Strategies for Chemical Professionals,
- Résumé Preparation, and
- Interviewing Skills.

There are even tips for conducting an electronic job search.

When you are ready to start looking for a position, you should post your résumé in the Chemjobs database (http://chemjobs.org). ACS members and Student Affiliates get first access to job listings. If you will be at one of the upcoming ACS national or regional meetings, sign up for the Chemjobs Career Center onsite. Offerings vary from meeting to meeting, but generally include career workshops, résumé reviews and mock interviews. National and many regional meetings will also provide onsite interviews with potential employers.

Once you have the job offer, be sure to check the salary offering against the ACS Salary Comparator. The comparator is available only to ACS members and Student Affiliates. Based on data from the annual starting salary survey and Chemcensus, the comparator calculates the salary range for the type of job and the area of the country that you specify.

quizzes, papers, projects, lab reports, and homework. In your administrative role, you may be required to plan the details of a class or a lab. This entails setting reasonable deadlines, keeping accurate records of attendance and grades, and preparing schedules, handouts, and so on. Experiences gained in both of these roles will prepare you not just for a career in academia, but also in industry.

In addition to technical skills, some of the must-have skill sets expected of new hires include aptitudes for working in global teams and embracing change, as well as proven skills in time management and communication. These 'soft skills' can easily be acquired and sharpened in assignments such as teaching assistantships in graduate school.

Global mindset: As a TA, you will encounter students with a wide variety of backgrounds, cultures, and nationalities. To succeed, you will need to learn quickly about these differences, and to respect them. Likewise, companies of almost every size are becoming increasingly global. Whether they have multicultural staffs, international operations, or global customers, they all face the challenge of dealing with individuals from diverse cultures. Working as a TA can help you understand, learn about, and appreciate this very important skill set.

Change orientation: The ability to embrace change is also an important quality. As a teaching assistant, you are constantly challenged to adapt to change. Very rarely are you stuck in one particular job, function, or role. Just as roles can change over the academic year or even within a semester in a university setting, the same is true in industrial jobs. You need to learn and adapt to new job or team functions in order to excel and contribute to a company's success.

Time management: Learning to prioritize and balance more than one project at a time is another crucial skill set. In whichever field or industry you may choose, it's likely that you will be challenged to manage and make progress on at least several different projects simultaneously. Learning the art of balancing multiple projects is vital, as are the abilities to get things done on time and to make appropriate decisions. On a personal note, I think this is the most valuable skill I sharpened as a teaching assistant.

Effective communication: This skill set is essential for collaborating effectively on teams, influencing peers, and motivating groups. Whether you're working as an instructor or an industrial chemist, you must successfully communicate with colleagues, teachers, supervisors, or others. An additional facet of this skill set is the ability to give feedback, both positive and negative, and to deal with people who exhibit difficult attitudes or behaviors.

In other words, all of the skills that you use and develop as a TA have direct applications in industry. The more comfortable you are with the skills described above, the more efficient and effective you will be — and thus the greater your usefulness to your employer. These skills represent a big part of working as a TA … and they're even more important for a successful career in industry. IC

The Eyes Have It!

Acceptable behaviors in one culture may be perceived differently by people from other backgrounds. For example, "popping" one's eyes can be interpreted as a sign of surprise in the U.S.; however, people from other cultures may instead interpret the action as a sign of anger.

Rama Konduri earned her Ph.D. from the University of Texas at Arlington in 2003. She works as a product design specialist at General Electric's Plastics Research and Development Center in Mt. Vernon, Indiana.

Forensic Chemistry

Introduction by Adam M. Boyd

Unlike the characters of CSI and other television hits, real forensic chemists rarely conduct investigative work, often specialize in one field, and regularly spend hours performing tests until they can reach a conclusion about a particular piece of evidence. It's less glamorous, maybe, but still a very cool job.

Evidence comes to forensic chemists in all forms: fingerprints, shards of glass, hair, fire debris, DNA, blood stains, and many other types. Using varied analytical methods and techniques, forensic chemists help to solve real-life mysteries by methodically analyzing evidence, interpreting their findings, and testifying about those findings in court. Their analyses are integral to catching and convicting criminals and, as a result, make chemistry one of the most effective weapons against crime.

Being a forensic chemist also strikes a balance between analysis and articulation. Even a sound chemical analysis by a brilliant chemist would be useless without the ability to explain to a jury how the analysis was done and what it means. Because physical evidence can be so influential in court, forensic chemists must conduct careful analysis, and provide impartial explanations of the science used to evaluate evidence. For this reason, accuracy, precision, and strong communication skills are highly prized characteristics in this line of work.

If you'd like to apply your knowledge of chemistry to the pursuit of justice, then perhaps you should consider a career in forensic chemistry. To learn more, read on.

Chemical Careers in Brief

This career brief on Forensic Chemists is part of a set of 30 such reports intended to educate teachers and students about job opportunities in the chemical sciences. Other briefs in the series include: chemical education, chemical sales, medicinal chemistry, science writing, and many more. Paper copies of the career briefs are available to Student Affiliates by contacting epic@acs.org. All students can access free copies of the career briefs by visiting www.chemistry.org/vc2/3wk/wk3.html. The Chemical Careers in Brief series is made possible by a grant from the Alfred P. Sloan Foundation.

Forensic Chemists...

Apply scientific disciplines to physical evidence

A forensic chemist is a professional chemist who analyzes evidence that is brought in from crime scenes and reaches a conclusion based on tests run on that piece of evidence. A forensic chemist's job is to identify and characterize the evidence as part of the larger process of solving a crime. Forensic chemists rarely conduct any investigative work; they handle the evidence collected from the crime scene. Evidence may include hair samples, paint chips, glass fragments, or blood stains. Understanding the evidence requires tools from many disciplines, including chemistry, biology, materials science, and genetics. The prevalence of DNA analysis is making knowledge of genetics increasingly important in this field.

Explain and defend results

Forensic chemists agree that public speaking skills and being comfortable with what you do are important personal characteristics for this career. As seen on Court TV, forensic chemists are often called upon to explain what was found and how they arrived at their conclusions.

Not all cases go to trial, but when one does, giving expert testimony in court is a significant piece of a forensic chemist's job. Some employers require their forensic chemists to go through several months of mock courtroom testimony training along with their regular training. Forensic chemists must be able to give an impartial explanation to the jury that will assist in a final judgment — forensic chemists analyze the evidence but do not determine the verdict.

PHOTOS.COM

Have various opportunities

The career path for most forensic chemists is through federal, state, or county labs associated with the medical examiner's office. However, there are different types of careers available, including those in other fields of forensic science, academe, or administration. Chemists can also move up within a particular organization, changing responsibilities along the way. For example, the director of a crime lab may supervise other forensic scientists rather than being involved in day-to-day analysis. A director may also be responsible for case review and general lab management. Some forensic chemists also use their technical training to pursue a career in patent law.

PHOTOS.COM

FACT FILE: Forensic Chemists

WORK DESCRIPTION — Forensic chemists apply knowledge from diverse disciplines such as chemistry, biology, materials science, and genetics to the analysis of evidence found at crime scenes or on/in the bodies of crime suspects. The field is a combination of criminalistics and analytical toxicology. Criminalistics is the qualitative examination of evidence using methods such as microscopy and spot testing, whereas analytical toxicology looks for evidence in body fluids through a range of instrumental techniques from optical methods (UV, infrared, X-ray) to separations analyses (gas chromatography, HPLC, and thin-layer chromatography). Mass spectrometry is also frequently used since it provides the strongest evidence in court. Most often, forensic chemists do not know the nature of the sample before they analyze it. The results of their work are used in police investigations and court trials, at which they may be called upon to provide expert testimony and explain their findings to a jury.

PHOTOS.COM


PHOTOS.COM

FOR MORE INFORMATION

American Academy of Forensic Science
P.O. Box 669
Colorado Springs, CO 80901-0669
719-636-1100
www.aafs.org

Forensic Science Society (United Kingdom)
Clarke Hose
18A Mount Parade
Harrogate
North Yorkshire HG1 1BX
United Kingdom
www.forensicsciencesociety.co.uk

You can also contact schools with academic programs in forensic science. University of New Haven (CT), George Washington University (DC), and John Jay College of Criminal Justice of the City University of New York all have graduate programs. Michigan State University has programs on the graduate and undergraduate level.


PHOTOS.COM

WORKING CONDITIONS — Forensic chemists generally work in government labs, which can be small, understaffed, and underfunded. They spend time preparing and giving testimony in court. Formerly under the jurisdiction of police departments, forensics has traditionally been totally male dominated. However, over the last 15 years, the field has opened up to women, who are moving up in its ranks.

PLACES OF EMPLOYMENT — Most labs are associated with a federal, state, or local police department, medical examiner's office, forensic services lab, or branch of the Federal Bureau of Investigation. There are some private labs that carry out forensic analyses.

PERSONAL CHARACTERISTICS — Versatility and patience are the most often cited qualities of a forensic chemist. Forensic chemists must be able to spend hours rigorously applying analytical techniques to evidence and then defending their work in a court of law. They must be able to clearly and concisely answer challenges to their findings. Integrity is also an important characteristic, because it is not unusual for the different interests in a case to try to sway the forensic chemist's position.

EDUCATION AND TRAINING — A strong background in chemistry and instrumental analysis as well as a good grounding in criminalistics is vital. A forensic science degree at both the undergraduate and graduate level is recommended. Those interested in working with trace evidence, such as glass, hair, and paper, should focus on instrumentation skills and take courses in geology, soil chemistry, and materials science. If forensic biology and DNA analysis are preferred, take microbiology, genetics, and biochemistry courses. Those interested in the toxicological aspects of this work should study physiology, biochemistry, and chemistry.

JOB OUTLOOK — The forensic science field is guardedly optimistic about job prospects for the future. Greater interest in the use of DNA analysis is expected to create more jobs. Those interested in DNA work should keep up with the rapidly changing technology and develop skills that distinguish them from the pack.

SALARY RANGE — For forensic chemists with a B.S. degree, incomes start in the high $30,000s per year. The median salary is $50,000. Chemists at the high end are paid more than $60,000 per year. Scientists involved with fingerprint analysis are on the lower end of the pay scale.

WHAT YOU CAN DO NOW — Contact local forensics labs and find out when a forensic chemist will be testifying in court. Attending courtroom testimony will give you a sense of whether this aspect of the work is right for you. Hands-on technical experience is more difficult to get. Most labs do not have internships but may take on volunteers. Academic requirements are tightening. Give some thought to graduate work and research projects that show you are capable of problem solving. To prepare for court presentations, scientists recommend participation in the debate team and school theater. iC

ADAM M. BOYD is an associate editor of **in Chemistry** and is an education associate in the ACS Undergraduate Programs Office.

UNDERGRADUATE

CALL FOR PAPERS

Undergraduate Programming Scheduled for March 26, 2007!

Abstract Deadline: November 14, 2006

More than 12,000 chemical science and engineering professionals will gather in **Chicago, Illinois**.

How about you?

Join the American Chemical Society for its 233rd national meeting from March 25—29, 2007

to present a research or chapter poster, prepare yourself for a career in the chemical sciences, network with other chemists, and have a good time!

How to Submit Your Abstract

To be considered for a presentation, submit an abstract via the ACS website, chemistry.org, by November 14, 2006. Just log on to chemistry.org/meetings, select the OASYS icon, and click on CHED. Select the appropriate discipline for undergraduate research posters (URPS) or SAACS for chapter posters. Submit your research abstract under one of these URPS categories:

■ Analytical Chemistry ■ Biochemistry ■ Chemical Education ■ Computational Chemistry ■ Environmental Chemistry ■ Geochemistry ■ Inorganic Chemistry ■ Medicinal Chemistry ■ Nanotechnology ■ Organic Chemistry ■ Physical Chemistry ■ Polymer Chemistry

There are no faculty presentations, and no late submissions will be accepted. Active Student Affiliates chapters may apply for travel grants to assist with registration fees. For more information, e-mail saprogram@acs.org.

2006 ACS Regional Meetings

35th Northeast Regional Meeting

October 5–7, Binghamton, NY
http://www.nerm2006.org/

The students of the Hartwick College, Oneonta, NY, SAACS Chapter will host the Undergraduate Program!

Friday, October 6

Career Connections Symposium, Undergraduate Reception, Undergraduate Poster Session

Saturday, October 7

Professional Recruiting Breakfast, Undergraduate Research Symposium

19th Rocky Mountain Regional Meeting

October 14–18, Tucson, AZ
http://www.rmacs2006.arizona.edu/

The students of University of Arizona, Tucson, SAACS Chapter will host the Undergraduate Program!

Saturday, October 14

Dinner with Industry, Chemical Solution Mixer

Sunday, October 15

Graduate School Breakfast, Liquid Nitrogen Ice Cream Social, Undergraduate Poster Session

41st Midwest Regional Meeting

October 25–27, Quincy, IL
http://membership.acs.org/m/mwrm2006/

The students of the Truman State University, Kirksville, MO, SAACS Chapter will host the Undergraduate Program!

Wednesday, October 25

Undergraduate Poster Session

Thursday, October 26

History Posters and Demonstrations

Friday, October 27

Graduate School Roundtable Discussion, Undergraduate Award Session

61st Southwest Regional Meeting

October 19–22, Houston, TX
http://www.chem.uh.edu/swrm06/

This meeting will include a variety of activities symposia, workshops, and more.

58th Southeast Regional Meeting

November 1–4, Augusta, GA
http://www.sermacs2006.org

The students of the Augusta State University, GA, SAACS Chapter will host the Undergraduate Program!

Friday, November 3

Chocolate Feast!

Saturday, November 4

Undergraduate Poster Session

Mark your calendars for the 2007 Spring ACS Regional Meetings.

39th Middle Atlantic Regional Meeting

May 16–18, 2007, Collegeville, PA

39th Central Regional Meeting

May 21–23, 2007, Covington, KY

62nd Northwest Regional Meeting

June 17–20, 2007, Boise, ID

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

Have you recently completed research based on a study-abroad or other international experience? If so, the **ACS Committee on International Activities** encourages you to present your research at the spring **ACS national meeting in Chicago,** Illinois. Students presenting research based on an international experience are eligible to receive an award from **IUPAC and the ACS Committee on International Activities!** Be sure to designate yourself as an international research participant when submitting your abstract.

To confirm your participation, e-mail Beth Rudd at b_rudd@acs.org.

SACNAS national conference

Science Revolution in Minority Communities: What Progress Have We Made?

The Society for Advancement of Chicanos and Native Americans in Science is holding its 2006 Annual Conference:

October 26-29, 2006
Tampa Convention Center
333 S. Franklin Street
Tampa, Florida 33602

For more information:
visit www.sacnas.org or
e-mail info@sacnas.org

Undergraduate Meeting Highlights

Thursday, October 26
Welcome Reception
4:00 – 5:00 PM

Inquiry, Apply, Interview & Enroll: Graduate School - Part I
8:30 – 9:30 PM

Friday, October 27
Inquiry, Apply, Interview & Enroll: Graduate School - Part II
8:00 – 9:45 AM

Undergraduate and Graduate Student Poster Session I
3:15 - 5:45 PM

Study Methods and Scheduling, Preparing for the GRE
8:00 – 9:00 PM

Saturday, October 28
Undergraduate and Graduate Student Poster Session II
9:00 - 11:30 AM

At the Frontiers of Chemistry
1:45 – 3:45 PM

Abstract Writing
4:00 – 6:00 PM

SACNAS Annual Awards Ceremony
7:30 – 8:30 PM

06AIChE
Annual Meeting, San Francisco, CA

The American Institute of Chemical Engineers 2006 Annual Meeting

November 12-17, 2006
San Francisco, CA

For students, the AIChE annual meeting is an ideal place to learn, network and receive recognition. An emphasis of the meeting will be globalization and the diversity of industries the chemical engineering profession serves. There are 17 Topical Conferences, 21 aligned programming groups and over 600 sessions at this year's event that will include covering innovations, advances in chemical engineering fundamentals and emerging technologies.

For more information, visit www.aiche.org

THE AMERICAN INDIAN SCIENCE AND ENGINEERING SOCIETY

28TH ANNUAL NATIONAL CONFERENCE

GENERATIONS OF INNOVATION

NOVEMBER 2-4, 2006
DETROIT, MI

FOR MORE INFORMATION, VISIT WWW.AISES.ORG

graduate school links

Click on the web links below to get information about the schools listed.

University of Central Florida:
http://www.cas.ucf.edu/chemistry/index.php

University of Nebraska-Lincoln:
http://chem.unl.edu/main/

SUNY, College of Environmental Science & Forestry:
www.esf.edu/chemistry

University of Tennessee:
www.chem.utk.edu

University of Cincinnati:
www.che.uc.edu

University of San Francisco:
www.usfca.edu/mschemistry

Oklahoma State University:
www.chem.okstate.edu

Wayne State University:
www.chem.wayne.edu

Indiana University, School of Informatics:
www.informatics.indiana.edu

University of New Orleans:
www.chem.uno.edu

McMaster University:
www.chemistry.mcmaster.ca/graduate

All URLs were accessed and accurate while this issue was in production.