



ChemNews

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An Institute of Technology Department

Fall 2006



GREETINGS FROM THE CHAIR

Dear Friends,

As I write this letter, we're beginning another academic year at the University of Minnesota. Life suddenly is more hectic: classes are gaining momentum, and the long Minnesota winter stretches in front of us. It's important for those of us in the Chemistry Department to make the time to reflect on the past year, to celebrate our successes, and to think about and plan for the future.

It's been quite a year, beginning with last September, when Wayne Gladfelter stepped down as Department Chair after six years of dedicated service to enjoy life as a "regular" professor again. Under his leadership, six new faculty members were hired into the Department, five new professorships were established to recognize our most distinguished faculty, and the new Claire LeClaire Instrumentation Facility was opened. The Chemistry Department is a better place for all of Wayne's hard work, and I thank him for his stewardship and his vision.

No sooner had I moved into the Chair's office than I learned that two Minnesota faculty members had won major national awards from the American Chemical Society: the Ralph F. Hirschmann Award in Peptide Chemistry to George Barany, and the Peter Debye Award in Physical Chemistry to Don Truhlar. This marked the beginning of a long string of awards to members of the Chemistry Department, which are described on page 12 of this newsletter. The year has been filled with champagne toasts and awards ceremonies and banquets. I wouldn't have it any other way!

There have been some changes in the faculty since you received last year's newsletter. We were delighted to welcome Christy Haynes onto the faculty as an assistant professor last autumn. Christy, whose research interests are in the area of bioanalytical chemistry, earned her Ph.D. at Northwestern and did post-doctoral work at the University of North Carolina. This summer, Aaron Masari, another Northwestern Ph.D., has joined the faculty as an assistant professor after the completion of his post-doctoral studies at Stanford. Aaron is establishing a research program in laser spectroscopy applied to condensed phased systems. Five chemistry professors—David Blank, Mike Bowser, Phil Buhlmann, Kris McNeill, and Gianluigi Veglia—were recommended for tenure this year, and as such have been promoted to associate professor. Congratulations to them all! On a somber note, all of us in Chemistry were very sorry when Emeritus Professor of Chemistry Stuart Fenton passed away early this year. Stu is survived by his wife, Eleanor, of North Oaks, Minnesota.

You are no doubt familiar with Kolthoff Hall, the "new" chemistry building. I am very excited to report that, after much planning, negotiation, and discussion, Kolthoff Hall began a major renovation this June. As part of the renovation, space that had been assigned to other departments will be returned to Chemistry. We will also be able to expand the amount of hood-intensive laboratory space, to upgrade our teaching labs, and (finally) to separate research labs from graduate student offices. The next two years are sure to be noisy, dirty, and frustrating, but the end result—a first rate facility for the

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Jeff Roberts

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Don Truhlar and George Barany Honored at ACS Meeting

Two Chemistry Department faculty members received awards for outstanding contributions at a ceremony at the Spring, 2006 National American Chemical Society meeting in Atlanta. Don is the winner of the **Peter Debye Award in Physical Chemistry**, given to recognize "outstanding research of a theoretical or experimental nature in the field of physical chemistry." People who have received this award constitute a virtual



Left to right: Jane Truhlar, Stephanie Marie Eaton Truhlar, and Don Truhlar with John Michael White (University of Texas)



Barbara and George Barany

burnishes its luster. More information on the Debye Award can be found at <http://tinyurl.com/naxlg>.

George received the **Ralph F. Hirschmann Award in Peptide Chemistry**. The award recognizes and encourages "outstanding achievements in the chemistry, biochemistry, and biophysics of peptides." The list of previous Hirschmann Award recipients is similarly illustrious. The first Hirschmann recipient, Nobel laureate Bruce Merrifield in 1990, was George's doctoral advisor. Information on the Hirschmann Award is on the web at <http://tinyurl.com/qlqja>.

Chemistry Promotions

From untenured Assistant Professor to Associate Professor with tenure:

David Blank
Michael Bowser
Phillipe Buhlmann
Kris McNeill
Gianluigi Veglia

Professor Richard Hsung

moved to the School of Pharmacy at the University of Wisconsin-Madison in February, 2006. Richard served as faculty for the Chemistry Department since 1997. We wish him the best in Madison.

Mark Distefano Honored for Outstanding Teaching

Mark Distefano has received one of this year's **Horace T. Morse-University of Minnesota Alumni Awards for Outstanding Contributions to Undergraduate Education**. With this award, Mark will be inducted into the University's Academy of Distinguished



Chair Jeff Roberts congratulates Mark on his award

Teachers. These awards are given to faculty members who reflect the University's emphasis on the importance of high quality undergraduate education.

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Newsletter Committee: George Barany, Wayland Noland, Jeff Roberts, Deborah Schoenholz, Andy Taton

Production: Deborah Schoenholz

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Dr. Aaron Massari Joins Department

Please join us in welcoming Dr. Aaron Massari to the Chemistry Department. Aaron was extended an offer after an extensive search and will be teaching here in the fall.

Aaron was born in Pennsylvania, but lived in Virginia, Maryland, and West Virginia before finally graduating from high school in Tucson, AZ. He attended Arizona State University, where he majored in chemistry and worked for several years as an undergraduate researcher in Devens Gust's research group. After graduation, he moved to Northwestern University, where he worked under the direction of Joseph Hupp on projects focusing on the electrochemistry and solar energy conversion of self-assembled thin films. He continued his education by joining Michael Fayer's research group at Stanford University, where, as an NIH postdoctoral fellow, he learned the ins and outs of two-dimensional spectroscopy.

Aaron's research at the University of Minnesota will apply multidimensional IR spectroscopy to conducting polymeric systems. Polymeric structures are dynamic, and their molecular motions can have a profound influence on the efficiencies with which mobile charges are able to

move through them. Aaron's research group seeks to identify the molecular motions that are important to charge transport. His ultimate goal is to improve the efficiencies of these materials by systematically controlling their dynamics at a molecular level. His students will learn many facets of linear and nonlinear spectroscopy, electrochemistry, and materials characterization.



Aaron Massari

IN MEMORIAM

by Wayland E. Noland

Stuart W. Fenton

April 29, 1922–February 4, 2006



Stuart W. Fenton devoted 35 years of his life to serving students at the University of Minnesota. He was a friend we shall miss, and he will live on in the appreciation of his many students. He passed away on February 4, 2006 from heart valve complications. He is survived by his wife, Eleanor, his brother, Gerald, and several nieces and nephews.

Born in London, Ontario, Stuart was descended from Scottish Tories who emigrated from the United States to Canada during the Revolutionary War. He worked as a Wartime Fuel Technologist from 1942 to 1945 while studying for his B.S., which he received in 1945 from Queen's University, Kingston, Ontario. The following year he took an M.S. degree there under the supervision of Dr. J. A. McRae, while simultaneously working under Dr. Leo Marion for the Canadian NRC in Ottawa. He earned his Ph.D. in 1950 at MIT under Dr. Arthur C. Cope.

Stuart joined the University of Minnesota's Chemistry Department in 1951. He was awarded an Alfred P. Sloan Foundation Fellowship for the period 1956-60, promoted to Associate Professor in 1957, and promoted to Professor in 1960. His early research at Minnesota, often in collaboration with colleague Dr. Richard T. Arnold, dealt with aspects of physical organic chemistry; work with his doctoral student Melvin W. Hanna on ring-opening in benzocyclobutene derivatives was reported in two papers in the *Journal of Organic Chemistry*; and later work with his students (including research assistant Sadanand Pathre) in collaboration with Prof. Chester J. Mirocha of the Department of Plant Pathology led to a series of four papers on the characterization and analysis of mold metabolites. His Ph.D. student John E. Franz, a Distinguished Fellow at the Monsanto Company, received an Outstanding Achievement Award from the University in 1988 for the development and synthesis of Roundup herbicide.

Stuart became Vice Chairman of the Chemistry Department in 1955 and Professor and Chairman of the Chemistry Department in 1960, serving in that capacity for seven years. A dedicated teacher, he clearly felt that teaching was a very important part of the academic enterprise and in 1981 he was awarded the George Taylor/I.T. Alumni Outstanding Teaching Award. Stuart was also very active in external and University affairs, serving on at least 17 University committees, at least four as Chair. He was a loyal member of the Campus Club and served as President of the Board of Governors.

In 1961, Stuart married Eleanor ("Sis") Salisbury, then Associate Dean of what is now the College of Continuing Education (CCE). He was a bridge player, an avid fisherman, a skier (Utah), a photographer, a world traveler, a reader, and he loved his dogs. He returned each August to the family tract of timberland north of Buckingham, Quebec, which included several small lakes. In August 1976, Stuart invited me to stop by on my way through Canada. I accepted, and had no regrets. It was nearly virgin water. He took me to a nearby bay in the evening where every cast produced a smallmouth bass. I have never seen any fishing like this before or after!

For the complete version of this memorial, go to www.chem.umn.edu

Gladfelter Delivers Seminars in Taiwan

Over spring break, March 10–18, 2006, Professor Wayne Gladfelter traveled to Taiwan to present seminars at National Chung Cheng University, National Tsing Hua University and Academia Sinica. One of the highlights of the trip involved squeezing in a little sightseeing and some fantastic dinners with several of our former graduate students.

Upper, left to right: Jen-Wei Hwang (Gladfelter group), National Mint of China; Chih-Hsin Chen (graduate student with Prof. J. T. Lin below); Kai-Ming Chi, National Chung Cheng University (Ellis group); Way-Zen Lee, National Taiwan Normal University (post-doc, Tolman); Jiann T'suen Lin, Academia Sinica (Ellis group)



Lower, National Chung Cheng University in Chia-yi, left to right: Joyce Yu Shucheng, Wei-Ping Hu (Truhlar group) [behind table], and their older of two daughters; Bi-ling-Chiau Tzeng; Wayne Gladfelter; Churng-Ren Chris Wang

Create a Graduate Fellowship in Chemistry and Double the Impact Of Your Gift

Imagine that with a phone call, an email, or the stroke of a pen you had the power to double all the good that a fellowship does: change a life, spark new ideas, generate breakthrough technologies, or underwrite creative work in a discipline you love. The 21st Century Graduate Fellowship Endowment gives you the power to create a meaningful legacy during your lifetime, and is the perfect opportunity to help nurture promising graduate students in Chemistry.

Established in 2000, this endowment is a result of the University licensing agreement for the AIDS drug Ziagen with Glaxo Wellcome PLC, a pharmaceutical company. The fund was created with royalties

generated by worldwide sales of Ziagen, which was developed at the University by a research team led by pharmacy professor Robert Vince. Gifts of \$25,000 or more that are designated to endow graduate fellowships may be eligible for matching through the fund.

Maybe you've been thinking about making a gift to Chemistry for a while now, but you've been waiting for the right moment to come along. I hope you will conclude that now is the perfect time to create a legacy by investing in human potential - the best bargain you'll ever find. For more information, contact David Hoffman, development officer for the Chemistry Department at 612-625-6035 or 800-587-3884, or dhoffman@it.umn.edu.

Alumni Donors Meet Student Scholarship and Fellowship Recipients



Left to right: Erik Grumstrup (scholarship); Weston Daniel (scholarship); Lisa Koenig (fellowship); Andrew Bierbaum (fellowship); Marion Owens; Ken Owens

Drs. Kenneth and Marion Owens graduated from the Institute of Technology in 1955 and 1953, respectively. As Chemistry alumni, they have shown a vision for the future and a desire for the Department of Chemistry to broaden its tradition of innovation. In 2000,

they invested in the future of graduate and undergraduate students in the Department of Chemistry with the establishment of the Kenneth E. and Marion S. Owens Endowed Fellowship in Chemistry, and the Kenneth E. and Marion S. Owens Scholarship in Chemistry. Ken and Marion visited with the Owens Fellows and Owens Scholars at the University of Minnesota Campus Club in April, 2006.

Institute of Technology Honors OAA Recipients

I.T. Dean, Steven Crouch, hosted a reception and ceremony September 23, 2005 honoring the college's distinguished graduates who have received the Outstanding Achievement Award (OAA), the University's highest alumni honor. Chemistry alumni who received an Outstanding Achievement Award were also honored by the Chemistry Department in Smith Hall (see top left photo below). Photos of past Chemistry Department recipients may be viewed in the lobby there.

A total of 243 I.T. alumni have received the OAA since its inception, and 62 of those were awarded to Chemistry alumni. They are among more than 1,000 OAA recipients whose names have been engraved on the Alumni Wall of Honor, a landmark work of art located on Gateway Plaza (www.alumni.umn.edu/alumniwallofhonor). The I.T. event was held in conjunction with the University's official dedication of the Alumni Wall of Honor.



Above: Newly dedicated Alumni Wall of Honor outside the McNamara Alumni Center



Right: Scholars Walk

Left to right: Tom Hoyer, Reuben Rieke '61, Wayland Noland, Steve Crouch, Les Krogh '52



Les Krogh '52 and Joan Krogh

Right: Academy of Science Awards Kiosk on Scholars Walk



Eric Heller Elected to National Academy of Sciences

Dr. Eric Heller, Chemistry Department alumnus (BS '68) and past recipient of the OAA, has been elected to the National Academy of Sciences. Professor Heller is now at Harvard. His name has been recorded in the Scholars Walk kiosk above.



Left to right: Elizabeth Rieke, David Hefley, Loretta Rieke, Reuben Rieke '61

GRADUATE AWARDS

2006 Graduate Research Symposium Travel Award



(left to right) Renee Mosing, Aaron May, and Betsy Edlund

Chemical Computing Group Excellence Award
Casey Kelly (Cramer, Truhlar)

2006-2007 Louise T. Dosdall Fellowship
Kelly Anderson (Seipmann)

2006-2007 Graduate School Doctoral Dissertation Fellowships
John York (Tolman)
Victor Sussman (Ellis)
Eric Klinker (Que)
Nathaniel Lynd (Hillmyer)

2006 Eastman Chemical Company Summer Fellowship
Paul Boswell (Buhlmann)

2006 Robert L. Fermi Outstanding Graduate Teaching Assistant Award

Leila Albers (Gleason)
Jessica Hilborn (Tolman)
Fan Li (Stein)
Matthew Peterson (Hsung)
Lisa Koenig

Honorable Mention

Qing Li
Kris Murphy
Jaye Warner

2006-2007 3M Science and Technology Fellowship
Melissa Fierke

2006-2007 Stanwood Johnston Fellowship
Erin Dalhke (Truhlar)

2006-2007 NSF Fellowship
Jennifer Lowe (Hillmyer/Tolman)

ACS Analytical Division Fellowship
Dwight Stoll (Carr)

Krell Institute Fellowship
Matt McGrath (Siepmann)

POST-DOCTORAL AWARDS 2006

NIH National Research Service Award Post-doctoral Fellowship

2004-2006: Joseph Emerson (Que)
2005-2007: Timothy Jackson (Que)

UNDERGRADUATE AWARDS

2006 Barry M. Goldwater Scholar
Eman Haidari

2006 Beckman Scholars Award
Dave Heppner

Awards continued on page 18

WISE Workshops

In October, the Women in Science and Engineering (WISE) in the Department of Chemistry organized and hosted a day of exciting, interactive science workshops for 50 girls from area middle schools



exploring the "Cool Chemistry" that affects our everyday lives. Topics included cosmetics, polymers, forensics, environmental science, DNA, atmospheric chemistry, and food science. It was entirely organized by graduate students and staff in the department. The event was sponsored by a donation from Donaldson lecturer Julia Phillips, with additional contributions from the Chemistry Department, the Office of University Women, and a host of others.

Chempedia—Explaining the Chemistry Behind Everyday Phenomena



Christy Haynes' fall Chemistry 1022 class poster session, held December 2, shows how successful her *Chempedia* project was. Working in teams of two to five, the students researched the science behind such well-known phenomena and products as chocolate, silly putty, superglue, catnip, toothpaste, sunscreen, hydrogen fuel cells, liquid crystals, biodegradable plastics, and many more.

Civil Service Award Goes to Eric Schulz

The Chemistry Department Civil Service Award Committee awarded the 2005 Civil Service Outstanding Service Award to:

ERIC W. SCHULZ - Information Technology Professional

This award consists of a \$750 prize and a plaque, which was presented to Eric at a small party in September. Eric and his intrepid IT buddies take care of all our computer needs and we can only say, Here Here! Congratulations, Eric.



Stan Is 60!!

Not that any of us could tell from watching him ride his bike intrepidly to and from work! But we all have birthdays, and 60 is a big one. The Department threw a party and we all got to eat cake.

Stan Bonnema has been with the Chemistry Department for 36 years; he handily manages all of us as the Department Administrator. Stan's family joined faculty and staff in wishing him the very best.



Greetings from the Chair

continued from page 1
Chemistry Department—will make it well worth the trouble.

I've enjoyed my first year in the chair's office, and I look forward to writing an annual letter for some time to come. One of the best parts of this job is getting to know alumni and other friends of the Chemistry Department. To those of you I know already, please keep in touch. To those of you I have yet to meet, don't hesitate to telephone or e-mail me, or—if you are in the Twin Cities—to drop by my office for a tour. We have a lot to be proud of in the Chemistry Department: superb facilities, a wonderful faculty and staff, and amazing students. There are few things I enjoy more than showing off, so please come on by!

Jeff Roberts

Happy
Birthday
Stan

Dale Goes to Georgia



Dale Randall, the Chemistry Department's Senior Stores and Delivery Manager, received an \$1,080 Seminar and Trade Show Attendance Grant from the National Association of Scientific Material Managers (NAOSMM) to attend their 33rd Annual Conference and Trade Show in Savannah, Georgia from Monday, July 31, to Thursday, August 3, 2006. Dale was again the official photographer for this event.

**Make Your Donation
to the Chemistry Department's
Special Projects Fund**

by enclosing your gift in the envelope provided in the back of this newsletter. Help support our faculty and students.

Many Thanks to our Donors in 2005

*Individual support from our alumni and friends is crucial to the myriad activities of our department. Thanks to your generosity, we have been able to offer fellowships and scholarships to our outstanding students, retain our best faculty, and implement projects which will improve our facilities. The **Chemistry Special Projects Fund** is the department's main discretionary fund, which supports student fellowships and awards as well as the bulk of the other activities mentioned in this newsletter. With gratitude, we acknowledge our 2005 donors.*

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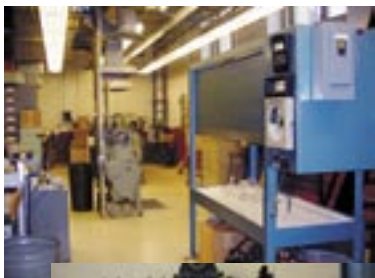
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Chemistry

Chemistry Department Glass Shop Still In Demand

As a favorite tool of science, glassware has, in many cases, helped scientists maintain their lead in cutting-edge technology. Owing to its unique properties, glass continues to be an essential component of industry, science, art, and our everyday world. Scientific glassblowers provide highly specialized glass apparatus for all universities with graduate research programs, government, private, and industry research laboratories, production facilities, the semiconductor industry, and many other aspects of scientific research.



The first scientific glass fabrication facility at the University was located in Physics 43 and was

opened by glassblower Ed Grenkie, who worked with Regents Professor of Physics Alfred O.C. Nier on the Manhattan Project before World War II. By the late 1950s, the shop had seven glassblowers on staff, including Marvin Dynes and Jim Merrit, plus another shop in the Electrical Engineering Department that was run by Johann Smolders, employing Gordon Smith from 1962 till 1966.

Information for this article was provided by Gordon Smith and Jim Merrit, as well as Glass Shop Manager Tom Stefanek.



The Chemistry Department Glass Shop, 49 Smith Hall, is one of these specialized facilities, run by its one remaining glassblower, Tom Stefanek. Tom came to the University in 1986 from SGA Scientific in Bloomington, New Jersey. At that time the shop was located in Kolthoff S196 and run by Hans Florell, who supervised just one other glass blower, Tom Reddy. Reddy was laid off by the University in 1996 and Florell, who had been with the Chemistry Department since 1969, retired in 2001, leaving Tom alone to manage all the needs of this department, other departments, or any organization that requires repair or fabrication of laboratory glass. He doesn't get much down time.

The Glass Shop moved to its current location in 2002 in anticipation of the Kolthoff renovation. Operating now from the basement of Smith Hall, Tom says that the shop is extremely well equipped, with three lathes including an unusually large one, two annealing ovens, a cutting and grinding room, and an oxygen generator. The oxygen is combined with natural gas to create the hot flame that is needed to melt glass.



Tom is a member of the American Scientific Glassblowers Society, which is located in Madison, Wisconsin, and provides support, information, and connection to the craftsmen and craftswomen located (increasingly sparsely) throughout the U.S.

UMN Chemistry is the largest Ph.D. granting program at the University of Minnesota. The National Science Foundation and the National Institute for Health provided \$12.2 million in grants to support basic and applied research in chemistry in fiscal year 2005.

Chemistry On The Mall

Kolthoff Hall Renovation

–Under Way–

Kolthoff Hall, now 37 years old, contains approximately 155,000 gross square feet of space and houses Chemistry Department research and teaching labs. It is used daily by nearly 500 students and faculty. One or more chemistry courses are required in 43 undergraduate programs. In 2004-05, 11,650 students were enrolled in chemistry classes.

The building is sound, however, the obsolete mechanical system could not provide adequate ventilation to laboratories that regularly use toxic chemicals, which has been limiting the level of research activities in the building. The entire heating ventilation and air conditioning and electrical systems need to be upgraded. In addition, correction of code deficiencies, installation of a fire suppression system, renewal of interior finishes, and exterior building repairs are necessary to extend the useful life of the facility. The renovation will occur in four phases while the building remains occupied.

The FY 2006 Capital Budget provided \$26,088,000 for the project. The FY2007 Capital Budget is planned to provide an additional \$3,600,000 to fund:

- Interior construction: (a) paint public spaces, (b) upgrade elevator, (c) upgrade flooring
- Mechanical System Upgrade: (a) chilled water connection to existing loop, (b) heat recovery system, (c) recondition air handling equipment, (d) upgrade air handling units to allow for improved air filtration for the lower level.

Kolthoff Hall is one of the most energy intensive buildings on the Twin Cities campus because of the amount of outside air that must be conditioned and delivered to the building as makeup air for the fume hoods. Because the required amount of outside air and the associated energy consumption is set by the program needs, there are few options for reducing energy consumption other than installing heat recovery during the renovation. The



installation process is highly disruptive, but space has been found elsewhere for labs and teaching while the renovations are made.

Architect: RSP Architects, Inc.
Mechanical / Electrical Engineers: Sebesta Blomberg and Associates
Construction Manager: M A Mortenson



George Barany

**Ralph F. Hirschmann Award in Peptide Chemistry sponsored by Merck Research Laboratories
ACS NATIONAL AWARD**

The Hirschmann Award is given to recognize and encourage outstanding achievements in the chemistry, biochemistry, and biophysics of peptides.

George's award citation reads: *For development of new resins and orthogonal protection methods for solid-phase synthesis of complex peptides for the study of protein folding and function.*

One of the supporting letters states, *"I can state candidly and unequivocally that by the criteria through which nominees for a prestigious award may be evaluated – originality and productivity in research, publications in first-rate journals, ability to attract funding, training of students and post-doctoral fellows, leadership, collegiality – Professor Barany's accomplishments rank as uniformly and truly outstanding. Without doubt, George Barany would be a highly distinguished recipient of the Ralph Hirschmann Award."*

George is the seventeenth recipient of this award. His graduate advisor, Bruce Merrifield, was the first in 1970.



Mark Distefano

Horace T. Morse—Minnesota Alumni Association Award for Outstanding Contributions to Undergraduate Education



Each year since 1965, the University of Minnesota has recognized a select group of faculty members for their outstanding contributions to undergraduate education. In addition to honoring individual faculty members, the award contributes to the improvement of undergraduate education at the University by publicizing their work to serve as a resource for the whole faculty.

A former student of Professor Distefano's writes, *"I attended the University of Minnesota, in various academic programs, from the fall of 1991 to the spring of 2002. In that time, I came into contact with many career educators. Only a few individuals stand out as great teachers, talented lecturers, and caring mentors, who always try to better reach out to their students and I place Dr. Distefano at the top of that list."*

Six other chemistry professors have received this award: Robert Brasted (deceased), Gary Gray, Ken Leopold, Kent Mann, Larry Miller (retired), and Lou Pignolet.

David Blank

Institute of Technology Student Board Professor of the Year in Chemistry Award

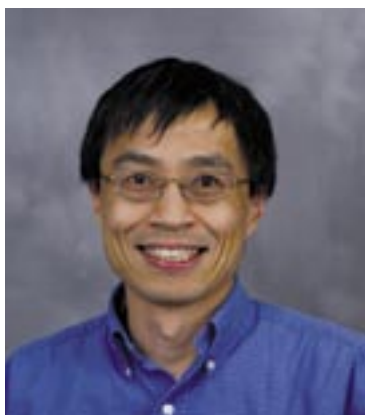
Professor Blank was named as "The Best Professor in the Chemistry Department" by the I. T. Student Board. The winner of this annual award is chosen by I. T. students who vote for their choice during registration every semester. This is the only teaching award that is chosen by an actual student vote.



Jiali Gao

Albert Hofmann Centennial Prize Presented by the Organic Chemistry Institute, University of Zurich

Professor Jiali Gao received the Albert Hoffmann Centennial Prize for his outstanding contributions to the area of computational enzymology.





Christy Haynes

Victor K. LaMer Award for Graduate Research in Colloid and Surface Chemistry

Annually, the ACS Division of Colloid and Surface Chemistry selects the outstanding Ph.D. thesis for the year. All Ph.D. candidates from chemistry, materials science, chemical engineering, physics, biochemistry, etc. programs, from U.S. and Canadian schools, who completed research in colloids or surface chemistry, are eligible for this \$2,500 award. Selection is based on originality, significance, and quality of the work, as well as clearly visible contributions of the student independent of the professor, and promise of the student as a future investigator.

Christy is the thirty-sixth recipient of the LaMer Award.



Searle Scholar Award

Assistant Professor Christy Haynes was named a 2006 Searle Scholar. The Searle Scholars Program was established in 1980 to support research in medicine, chemistry, and the biological sciences. Awards are made to outstanding scientists who are in the first or second year of their first appointment at the assistant professor level and whose current appointment is a tenure-track position.

A citation from the nomination letter states, *"Dr. Haynes is a truly exceptional candidate for the Searle Scholar Program. Her record clearly demonstrates her focus, drive, and creativity, and her proposed research effectively matches the goals of the Searle program. Her passion and enthusiasm for students and science inspire confidence that she will become a leader in her field and in the classroom."*



3M Nontenured Faculty Award

Haynes received the 3M Nontenured Faculty Award from the 3M Corporation, funded by the 3M Contributions Program. The company administers these awards as a means of supporting innovative young scientists at universities across the country.

Kris McNeill

Taylor Career Development Award from the Institute of Technology

Assistant Professor Kristopher McNeill received the 2006 George W. Taylor Career Development Award, which recognizes exceptional contributions to teaching by a candidate for tenure.



Richard S. Smith
Thomas J. & Mary Pyne Smith
Ryan C. Smith
Terrance P. Smith
Roger C. Splinter
Barbara J. Stallman
Mark & Kathleen Steine
Alfred F. Steinhauer
Robert E. Stevens
Joseph F. Stieber
Roger W. Strassburg
Melvin P. & Dorothy B. Stulberg
Joseph C. Suhadolnik
Richard J. Sundberg
Dale G. Swan
April J. Swanson
Laychoo Tan
Kenneth J. Tauer
Khalid A. M. Thakur
Todd C. Thompson
Tracy R. Thompson
James R. Throckmorton
Steven J. Tinker
Wade J. Tornquist
Charles A. Triplett
Edward T. Ulrich
Rebecca A. Urbanek
Loc X. Van
James R. Vyvyan
James J. Wade
Terence C. Wagenknecht
Joseph T. Warden, Jr.
Edward O. Welke
Edward L. Wheeler
Larry R. Wilson
Sharon E. Worthington
Ellen L. Wu
Lee R. Zehner
Hongyu Zhao
Jin Zhao & Wei Chen
Patrick G. Zimmerman

Attention Alumni

Send us your update to either
www.chem.umn.edu/alumni/contact.html
or alumni@chem.umn.edu

Let us know what you think.
We want this publication to reflect your interests. Send comments to:
ChemNews
Department of Chemistry
207 Pleasant Street S.E.
Minneapolis, MN 55455
or
chemnews@chem.umn.edu

Karin Musier-Forsyth



Distinguished McKnight University Professorships

These Professorships are made possible by an endowment gift from the McKnight Foundation to the University of Minnesota Graduate School for the purposes of supporting faculty development. Originally conceived as a career development plan for outstanding junior faculty, the program was expanded to incorporate a distinguished mid-career fac-

ulty program. The name of the award signifies the importance the University places on this unique public-private partnership.

The goal of the Distinguished McKnight University Professorship program is to honor and reward the University of Minnesota's highest-achieving faculty who recently attained full professor status—especially those whose careers have developed at the University, whose intellectual work and reputation are identified with Minnesota, and whose work has brought great renown and prestige to the University of Minnesota.

For the first time since the award's inception, two faculty from the same department have been honored. Of the 54 professorships awarded thus far, Chemistry holds 7—more than any other department.

An excerpt from Karin's nomination letter reads, "*Professor Karin Musier-Forsyth is an outstanding scholar, mentor, and colleague: highly intelligent, focused, energetic, and dedicated. She is a rigorous, resourceful, and productive scientist who has the instincts and the creativity to identify and take on research problems that are important, timely, and have implications for the development of new ways to treat disease. Her studies have had an important impact on the exponentially growing field of protein-RNA interactions, basic biology, and targets for therapeutic intervention. Karin Musier-Forsyth's presence has benefited the University of Minnesota in countless ways.*"

To quote from Ilja's nomination letter, "*Ilja has a world-wide reputation and his presence brings distinction and honor to the University of Minnesota. This reputation is also evidenced by the more than 100 invited lectures and seminars given world-wide. It is remarkable to see that Ilja not only gets invited to speak at the best chemistry departments, but also is equally in demand in chemical engineering and physics departments.*"

Musier-Forsyth and Siepmann join Professors Barany, Cramer, Lodge, Roberts, and Tolman in receiving this high distinction.

J. Ilja Siepmann



Wayland Noland

Charles E. Bowers Faculty Teaching Award



Established in 2000 by alumnus John Bowers (Physics '66) in honor of his father, Professor Emeritus Charles E. Bowers, this award recognizes an outstanding IT professor who has demonstrated exceptional interest and commitment to teaching. Professor Wayland Noland is the 2006 recipient of the Bowers Faculty Teaching Award and is the first chemistry faculty member to receive this award.

Professor Dan Rich, now the Ralph F. Hirschmann Professor of Medicinal and Organic Chemistry at the University of Wisconsin, in his supporting letter describes Way's impact on his as follows, "*I spent over a year and a half doing research with [Way Noland], which was enormously stimulating and fun. But more importantly, it convinced me that I was actually cut out to do chemical research for my lifelong profession.*"

Professor Noland is the seventh recipient of this award.

Chemistry Degrees Granted, July 1, 2004 to June 30, 2005

Master's Degrees Advisor

Thesis Title

Ismael Ferrer	T. Lodge	<i>Plan B</i>
Heather Haley	R. Hsung	<i>Applications and Investigations of [3+3] Cycloadditions in the Synthesis of Heterocyclic Natural Products.</i>
Christopher Jeffrey	T. Hoye	<i>Part I: The Epoxidation of 1.0 mg of Geraniol: A Small-Scale Introduction to the Organic Research Laboratory. Part II: Relay Ring-Closing Metathesis: Controlling the Regioselectivity of Tandem Enyne Metathesis.</i>
Emily Metcalfe	G. Veglia	<i>The Backbone Dynamics of Phospholamban and Structure and Backbone Dynamics of Phospholamban Phosphorylated at Serine16 by NMR Spectroscopy.</i>
Amanda Heikkila	C. Forsyth	<i>Synthetic Studies Towards C1-C12 of the ABCD Domain of Azaspiracid.</i>

Ph.D. Degrees

Advisor

Thesis Title

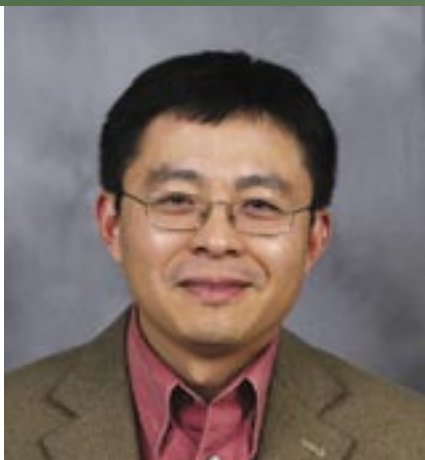
Kelly Anderson	M. Hillmyer	<i>High Impact Polylactide Composites.</i>
Jeremy Beebe	L. Miller; D. Frisbee	<i>Charge Transport and Contact Effects in Nanoscale Electrical Junctions Formed via Conducting Probe Atomic Force Microscopy.</i>
Craig Berry	R. Hsung	<i>Cycloaddition Reactions with Allenamides.</i>
Noelle Beyer	B. Liu	<i>Part I: Investigation of the Biosynthesis of GDP-L-Colitose. Part II: Characterization of a Key Enzyme in the Biosynthesis of Mitomycin C</i>
Nicole Boalen	M. Hillmyer	<i>Chemical Modification of Polyolefins</i>
Laurie Breyfogle	W. Tolman; M. Hillmyer	<i>Mechanistic Studies of Cyclic Ester Polymerizations by Discrete Metal-Alkoxide Catalysts.</i>
Taewoon Cha	X. Zhu	<i>Surface Chemical Modification for the Immobilization of Biomolecules.</i>
Jiehao Chen	C. Forsyth	<i>Part I. Total Synthesis of the Marine Cyclodepsipeptide Apratoxin A. Part II. Structural Determination and Total Synthesis of Spongidepsin. Part III. Improved Synthesis of the C3-C17 Domain of Phorboxazole A and Synthesis of a Fluorescent Phorboxazole Derivative.</i>
Kevin Cole	R. Hsung	<i>Applications of the Formal Oxa-[3 + 3] Cycloaddition to Natural Product Synthesis.</i>
Matthew Craddock	K. Leopold	<i>Microwave Spectroscopic Studies of Weakly-Bound and Hydrogen-Bonded Molecular Complexes.</i>
Jun Dai	P. Carr	<i>Understanding Retention Mechanisms and Adjusting Selectivity of Basic Pharmaceutical Separations by Reversed-Phase Liquid Chromatography.</i>
Brian Eklov	T. Hoye	<i>I. No-D (No-Deuterium) Proton NMR Spectroscopy; II. Toward Computing the Relative Configurations of Structurally Complex Compounds; III. Toward a Total Synthesis of (-)-Gigantecin.</i>
Brent Gregersen	D. York	<i>Quantum Mechanical/Molecular Mechanical Study of Transphosphorylation Thio Effects in Solution.</i>
Minh Kim Hong	K. Musier-Forsyth	<i>Investigating Nucleic Acid-Protein and Protein-Protein Interactions That Govern HIV-1 Replication Using Fluorescence Techniques.</i>
Daron Janzen	K. Mann	<i>Investigations of Molecular Structure / Electronic Structure Relationships of Coordination Complexes, Organometallic Salts, and Organic Molecules.</i>
Yongseok Jun	X. Zhu	<i>The Modifications of Silicon Surfaces by Organic Monolayers and Their Applications.</i>
Joo Hyun Kang	X. Zhu	<i>Herringbone and Pi-Stacked Phases of Pentacene Thin Films Grown on Metal Surfaces.</i>
Christopher Kinsinger	C. Cramer	<i>Computational Studies of Model Complexes of Copper-Containing Metalloenzymes.</i>

continued on page 20

Bachelor's Degrees and Home Town

Christopher Anderson	Rochester, MN	Yoelin Gozalie	Minneapolis, MN
Kari Rae Anderson	Eagan, MN	Steven Graf	Lino Lakes, MN
Dana Marie Baas	St. Louis Park, MN	Kim Ngoc Ha	Minneapolis, MN
Felix Boakye-Agyeman	Rochester, MN	Matthew Hanley	Rochester, MN
Benjamin Harris	Holly Springs, NC	Michael Hanson	Minneapolis, MN
Nicole Herried	Blair, WI	Staci Hart	Minneapolis, MN
Brandon Johnson	Minneapolis, MN	Juliette Jones	Minneapolis, MN
Anne Kaintz	New Brighton, MN	Anthony Kwong	Fridley, MN
Mila Sadat Khorooosi	Sioux Falls, SD	Nicholas Legendre	Eagan, MN
Jacob Paul Kilian	St. Michael, MN	Dias Linton	Minneapolis, MN
Mark Daniel Lange	Minneapolis, MN	Kristin Lippitt	Superior, WI
Per Arvid Lee	Minneapolis, MN	Andrew Louwagie	Minneapolis, MN
Melissa Manthei	Minneapolis, MN	Jennifer Magdal	Eden Prairie, MN
Lindsey Morrison	Hastings, MN	Emily Nelson	Embarrass, MN
John Ngoc Nguyen	Minneapolis, MN	Kevin Nennig	Minneapolis, MN
Shawn M. Olson	Forest Lake, MN	Okey Okechukwu	Cottage Grove, MN
Julia Helen Ortony	Minneapolis, MN	James Ormes	Stevens Point, WI
Triana Thao Pham	Plymouth, MN	Aernie Othman	Minneapolis, MN
Breeyawn Ririe	Minneapolis, MN	Kyle Page	Minneapolis, MN
Joseph T. Rupnow	Minneapolis, MN	Scott Peters	Brooklyn Park, MN
Jaclyn Steen	Minneapolis, MN	Joshua Phillips	Green Bay, WI
David Walt	North Saint Paul, MN	Serena Pierson	St. Paul, MN
Jiangwei Yao	Apple Valley, MN	Rachel Quarberg	Minneapolis, MN
Abdulla Khamis Al Mehrezi	Abu Dhabi, UAE	Matthew Reeves	St. Paul, MN
Sarah Jan Anderson	Prior Lake, MN	Edward Rusli	Minneapolis, MN
Matthew Awde	Minneapolis, MN	Jonathon Sczepanski	Rochester, MN
Gregory Bettger	Minneapolis, MN	Jeannie Seidel	Inver Grove Heights, MN
Andrew Bierbaum	Eyota, MN	John Soderstrom	Moorhead, MN
Christina Borgen	Shakopee, MN	Troy Sturm	St. Paul, MN
Bonnie Brooks	Farmington, MN	Hery Sudjono	Minneapolis, MN
Sue Young Cho	St. Paul, MN	Nathaniel Tatarek	Eagan, MN
David Owen Cook	Minneapolis, MN	Tadesse Tesfaye	Minneapolis, MN
John Cook	Bloomington, MN	Kevin Tung	Minneapolis, MN
Jesse Daleiden	Rogers, MN	Prateek Verma	Hopkins, MN
Leila S. Datoo	Minneapolis, MN	Michael Wadsworth	Bristol, CT
Kevin Erion	Mounds View, MN	Janielle Ward	Minneapolis, MN
Erik Esbjornsson	Minneapolis, MN	Gerald E. Weineck	South St. Paul, MN
Angela Floyd	Minneapolis, MN	Ben Wiltsie	Rochester, MN
Tyler Fuller	Brooklyn Park, MN	Abebayehu Yilma	St. Paul, MN
Chad Geppert	St. Paul, MN	Benyam Yoseph	Minneapolis, MN

Faculty Awards 2005-2006 *continued from page 15*



Xiaoyang Zhu

Friedrich Wilhelm Bessel Award Presented by the Alexander von Humboldt Foundation, Germany

Professor Xiaoyang Zhu has received a Friedrich Wilhelm Bessel Award from the Alexander von Humboldt Foundation in Germany. The Humboldt Foundation grants approximately 20 Bessel Research Awards annually to young, top-flight scientists and scholars from outside of Germany who are already recognized as outstanding researchers in their fields. The award winners are also invited to work on research projects of their own choice in cooperation with colleagues in Germany for periods of between six months and one year.

2006 Robert C. Brasted Outstanding Undergraduate TA Award

Max Mason

2005 Gleysteen Scholarship

Dave Heppner

2005 Thomas DuBruil Undergraduate Research Award

Dave Heppner

2005-2006

Department of Chemistry Fellowships and Prizes

SENIOR AWARDS

Peteris Auzins Memorial Scholarship

2005: Kevin Tung

Sally Herz Memorial Scholarship

2006: Umang Nagpal

David A. and Merece H. Johnson Scholarship

2005: Prateek Verma, Jacob

Kilian, Vladimir Spasojevic

2006: Anay Bedi, Eric Buck,

Loren Greenman, Quincy Long, Amanda Musch, Jacob Sirek

Kenneth E. and Marion S. Owens Scholarship in Chemistry

2005: Mila Khoroosi

2006: Weston Daniel, Eric

Grumstrup

JUNIOR AWARDS

Robert C. Brasted Memorial Fellowship

2005: Anay Bedi

2006: David Heppner

Lloyd W. Goerke Scholarships

2005: Loren Greenman, Weston

Daniel

2006: Sarah Page

M. Cannon Sneed Scholarship

2005: Erik Grumstrup

George T. Walker Scholarship

2005: Jacob Sirek

2006: Eman Haidari, Ellis Warner

Peteris Auzins Memorial Scholarship

2005: Quincy Long

SOPHOMORE AWARDS

Thomas DuBruil Memorial Award

2005: Mark Anderson, David Heppner, Michelle Jacobs

2006: Derek Straka

GENERAL AWARDS

J. Lewis Maynard Memorial Prize in

Advanced Inorganic Chemistry

2005: Shawn Olson

2006: Kyle Dullinger

CRC Freshman Chemistry Achievement Award

2005: Erik Strungs

2006: Emily Gunnerson

Merck Index Award

2005: Joshua Allen, Eman Haidari

2006: Jennifer Kuyava, Aleksander Knezevich

Undergraduate Award in Analytical Chemistry

2005: Jennifer Chen

2006: Jennifer Messer

Sally Herz Scholastic Excellence Award

2006: Katie Lee, Joshua Allen,

Laura Clapper, Han Na Park, Lau-

ren Haak, Jacob Urbancic, Rebec-

ca Loper, Cheston Hsiao, Rachel

LaFond, Alicia Engbrecht, James

Swakow

GEORGE BARANY MIXES MUSIC AND CHEMISTRY IN NEW YORK TIMES CROSSWORD

By Deane Morrison

Excerpted from UMN News, Jan. 27, 2006

Just before Thanksgiving, George Barany got an urgent message from his young friend Michael Shteyman. Mozart's 250th birthday was coming up January 27, 2006, and Shteyman urged Barany to collaborate on a New York Times crossword puzzle to commemorate the occasion. Barany, a University chemistry professor and classical music buff, had worked on puzzles before with Shteyman, a recent graduate of Johns Hopkins University and already an author of some 30 Times crosswords.

Intrigued by the idea, Barany accepted. In consultation with puzzle editor Will Shortz, the pair scrambled to create a Mozart-themed Sunday puzzle in time for the big birthday. They succeeded, and the Times ran the puzzle, titled "The Sound of Music," January 22. It appeared in the Star Tribune and Pioneer Press, among other newspapers, January 29.

See the next page for a Barany-Shteyman puzzle constructed specifically for this newsletter!



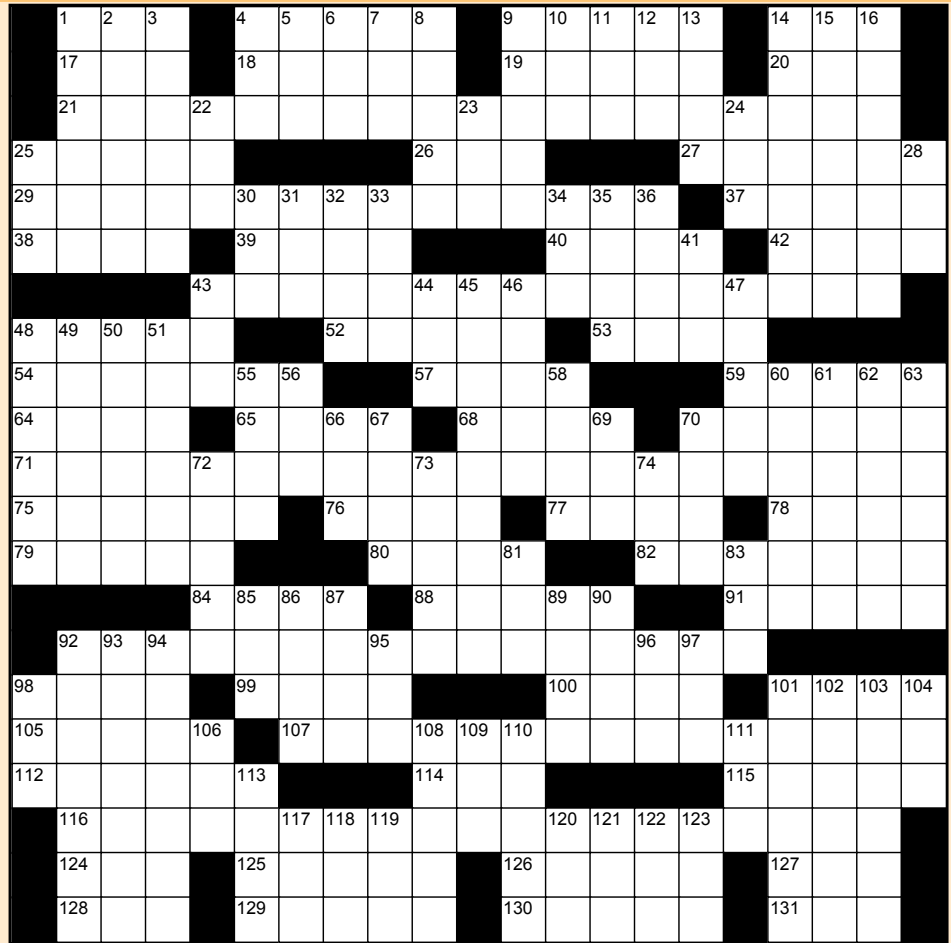
ACROSS

- 1 Winter bug
 4 Exploits
 9 Sexologist Hite
 14 Santa's little helper
 17 Blouse, e.g.
 18 Tin Pan Alley org.
 19 Either President Bush
 20 Metal oxide, MW 75, the black form of which is reactive
 21 Protocol at a current Minnesota Chemistry Department faculty meeting?
 25 "Today" weatherman Al
 26 ___ v. Wade (1973 Supreme Court decision)
 27 Taoism founder
 29 Comparison of Minnesota teaching styles (Kent and Wayland), when all's Donne?
 37 Emulates a raptor
 38 Cross words
 39 Peter or Paul, but not Mary
 40 Homeboy's habitat
 42 Jet-setters' jets, once
 43 What students of Minnesota chemist Paul would say as he entered the classroom?
 48 Heart chambers
 52 Hi from HI
 53 Gumbo ingredient
 54 Persian, now
 57 Go off the deep end
 59 Big name in mobile phones
 64 Cacophonies
 65 Bank opener?
 68 Actor Sean or current Minnesota chemist Lee
 70 Unconventional physician
 71 Catch-phrase for "Father of Analytical Chemistry"? (with a nod to 131-across)
 75 Fox who once guarded second base
 76 It is neutralized by HCl to make table salt
 77 Party animal?
 78 It may be fleeting
 79 The color of money
 80 Gait faster than a walk
 82 Fixes previous drafts
 84 Simplicity
 88 Creating a knot
 91 Like helium, neon, or argon, but not necessarily xenon
 92 Minnesota theoretical chemist Bob's expectations for students he taught?
 98 Web destination
 99 Labels on macromolecules, e.g.
 100 Milky Way ingredient?
 101 Neuwirth who won a Tony for "Chicago"
 105 Military mess?

- 107 Academic rebuff from Minnesota chemist Fred?
 112 Hot off the press
 114 Article in Andalusia
 115 Taking to court
 116 Advisor choice (Bob or John) once faced by Minnesota p-chem students?
 124 Sweet suffix
 125 Eratosthenes had one to find primes
 126 A la King
 127 Short life story
 128 Map line: abbr.
 129 Camouflages
 130 Conductor Koussevitzky
 131 NBC comedy show since 1975 (compare to 71-across)

DOWN

- 1 '60s sitcom set at Fort Courage
 2 "_____, no hands"
 3 Optimistic
 4 Remote
 5 Winter Boston hrs.
 6 World's largest professional org., founded 1876
 7 Feather's partner
 8 Brush aside
 9 Fe-C alloy often containing other metals such as Mn, Si, etc.
 10 "For ___ a jolly good fellow"
 11 Prefix with skeleton
 12 Brit. flyers
 13 Minor tautomer for majority of ketones
 14 Back
 15 Pinocchio's nose growth could be an example of one
 16 Novelist Frederick or current Minnesota chemist Craig
 22 Suffix with east- or west-
 23 Elton's john
 24 50 Cent's genre
 25 They use TLC
 28 Serpentine shape
 30 Degree in math?
 31 Expert ending?
 32 It can be myth-understood?
 33 Sea bordering Kazakhstan and Uzbekistan
 34 "Eureka!"
 35 Answering one's cell phone in the middle of a class, for example
 36 Loading area
 41 Rimsky-Korsakov's opera "Le Coq ____"
 43 Mai ___ cocktail



- 44 Landscaper's need
 45 Nautical greeting from Minnesota chemist Tom?
 46 Connoisseur
 47 House of Lords
 48 Giving a hand to
 49 What cyanuric acid is, with respect to cyanic acid
 50 Get on one's nerves
 51 Shoe part
 55 Part of a Molière play
 56 Source for >\$200 M annually at U of M
 58 They might be tight or loose
 60 Organic compound with a double bond
 61 Enzyme that adds a phosphate
 62 It can be structural, geometric, or conformational
 63 Certify
 66 Weight unit for bricks, in a saying
 67 "____ first you don't succeed ..." (bad advice for skydiver)
 69 Big Apple daily, for short
 70 Opposite of 123-down
 72 Record holder
 73 Hold ____ (talk at great length)
 74 Paddle
 81 ___-tac-toe
 83 Compete
 85 Towards the rear
 86 Drench
 87 "Cogito, ___ sum"
 89 Snack
 90 Glory's partner
 92 Desire
 93 Not for free
 94 Evaluate a scientific manuscript
 95 Monogram of "Cats" author
 96 Word repeated before "Ski-U-Mah," in a U of M fight song
 97 Welcome sign on Broadway
 98 Ukraine and Belarus, once: abbr.
 101 Small ads
 102 Insert, as a scene into a video
 103 Less frequently used name for C6H6
 104 Bit of work
 106 Element 106, according to IUPAC
 108 Fishing accessories
 109 ___-cone
 110 "Who ___?" (Gershwin/Balanchine ballet)

- 111 Employ
 113 New age musician John
 117 Noon on a sundial
 118 Kennedy or Koppel
 119 12/24 or 12/31
 120 It may be imposed, but never levied
 121 Hockey great Bobby
 122 Predetermine the outcome of
 123 Teeny

Answers to this puzzle may be found at www.chem.umn.edu

Ph.D. Degrees**Advisor****Thesis Title**

Bethany Koehntop	G. Veglia	<i>Structure, Topology, and Organotin Interactions of the Membrane Protein Stannin: A Solution and Solid-State NMR Investigation.</i>
Douglas Latch	K. McNeill	<i>Environmental Photochemistry: Studies on the Degradation of Pharmaceutical Pollutants and the Microheterogeneous Distribution of Singlet Oxygen.</i>
Hollie Lewis	T. Hoye	<i>Studies Related to the Ottelione Family of Natural Products.</i>
Eduard Luss-Lusis	C. Forsyth	<i>Total Synthesis of Fostriecin.</i>
Vanessa Lynch	D. Truhlar	<i>Monte Carlo Path-Integral Methods for Vibrational-Rotational Partition Functions.</i>
Laura MacManus-Spencer	K. McNeill	<i>Studies of Excited State Chemistry: Part 1. Hydrogen Bonding and the Potential for Excited State Proton Transfer in Pyridylpyrrole Alcohol Complexes. Part 2. The Development and Application of a Chemiluminescent Detection Method for Singlet Oxygen.</i>
Kylie O'Brien	M. Bowser	<i>Monitoring D-Serine Dynamics in the Central Nervous System by Capillary Electrophoresis.</i>
Jingzhi Pu	D. Truhlar	<i>Chemical Reaction Dynamics and Potential Energy Surfaces for Hydrogen Transfer Reactions and Large Systems.</i>
Anne Reynolds	W. Tolman	<i>Synthetic Models of Dioxygen Activation by Mononuclear Copper Enzymes.</i>
Sarah Schmidtke	D. Blank	<i>Physical Properties and Dynamics of Hydrogen Bonding and Proton Transfer Compounds.</i>
Lee Stanek	W. Gleason	<i>Synthesis and Characterization of Copolymers Containing Azlactone Functionality.</i>
John Stubbs	J.I.Siepmann	<i>Simulations of Microheterogeneous Fluids.</i>
Jason Thompson	C. Cramer	<i>Improved Continuum Solvation Models for Density Functional Theory and Hybrid Density Functional Theory and Prediction of Aqueous Solubilities with Continuum Solvation Models.</i>
Jizhou Wang	T. Hoye	<i>Synthetic Efforts Towards a Total Synthesis of Haterumalide NA/Oocydin A; Deciphering the Coupling Constants of Spiruchostatins A and B; Design and Synthesis of Analogs of Latrunculin A and B, Potent Actin Polymerization Inhibitors.</i>
Craig Zifcsak	R. Hsung	<i>Synthesis of Indoloquinolizidine Alkaloids.</i>

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