

South Dakota State University
**Open PRAIRIE: Open Public Research Access Institutional
Repository and Information Exchange**

Chemistry & Biochemistry Newsletter

Chemistry & Biochemistry

Fall 2006

Chemistry & Biochemistry Newsletter

Department of Chemistry & Biochemistry, South Dakota State University

Follow this and additional works at: http://openprairie.sdstate.edu/chem_news

 Part of the [Chemistry Commons](#)

Recommended Citation

Department of Chemistry & Biochemistry, South Dakota State University, "Chemistry & Biochemistry Newsletter" (2006). *Chemistry & Biochemistry Newsletter*. Paper 8.
http://openprairie.sdstate.edu/chem_news/8

This Newsletter is brought to you for free and open access by the Chemistry & Biochemistry at Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. It has been accepted for inclusion in Chemistry & Biochemistry Newsletter by an authorized administrator of Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. For more information, please contact michael.biondo@sdstate.edu.



South Dakota State University

Chemistry & Biochemistry

Fall 2006

Inside

Page 2-3

- **Grad students attend International Summer School in Green Chemistry**

Page 3

- **Alumni News**

Page 4

- **Alum receives brigadier general stars**

Page 5

- **New Grad Students**

Page 6

- **Tanaka endows undergraduate scholarship**
- **Midwest Seeds becomes internship partner**

Page 7

- **The 2006/2007 Burris Lecturer leader in drug discovery**

Page 8

- **New Faculty**
- **Perfecting the formula for the future of SDSU chemistry**

Message from the Department Head



Welcome to the 2006/2007 academic year!

This year has seen the Department pass some milestones in terms of our enrollment. We have the largest number of chemistry majors in our history, sixty-five, the largest number of CLS majors, forty-five, and we have five students enrolled in our new American Chemical Society-certified biochemistry major that we began offering this fall. Our graduate enrollment is also up to twenty-eight students, our largest group in almost ten years, a growth supported by an increasing number of grant-funded research assistantships.

The overriding issue absorbing our time this year has been the facility plan for the new chemical sciences building that will replace Old Shepard Hall. We are nearing the final stages in the design process. Once approved by the Board of Regents, I will share it with you in the form of a “special edition” newsletter sometime later this winter. Fully completing this project will be a challenge for us—as you may recall the Board is providing \$24 million, but has charged us with raising \$6 million. This is a tremendous opportunity for you to get involved. And we are going to need your help! We are (obviously!) looking for donations, but we are also in need of your time and contacts to help in the fundraising process. If you are interested in helping us in any way or form, I would be delighted to visit with you about how you can contribute. Please don't hesitate to contact me.

In addition to focusing our attention on the facility plan, we have also completed revision of the strategic plan for developing our program. The original strategic plan was developed in 2003 in conjunction with our regular seven-year Board of Regents Program Review. After assessing what we had accomplished through the items identified in that plan late last fall (of 2005), the faculty have looked forward and decided where we now need to move in light of current chemistry funding policy and pedagogical trends. The resulting document articulates our goals and how we are going to get there. It sets some ambitious targets (for example increasing the number of graduate students enrolled in the program to fifty in five years) that will be used to inform our decisions in response to questions such as what research expertise to add to the faculty as we fill vacant positions or what core instrumentation facilities we must work to develop. If you are interested in a copy of this plan, please do not hesitate to contact me.

It is mid-October as I write this, but you probably won't receive this newsletter until well after the Thanksgiving holiday. So on behalf of all the Department's faculty and staff, I wish you and your family a joyous and peaceful holiday season.

Stay in touch!

james.rice@sdstate.edu



**chemistry
& biochemistry**

Grad students attend International Summer School in Green Chemistry

Learning takes place in the classroom, laboratory, and even off-campus. During the past two summers, graduate students working under the mentorship of Dr. Doug Raynie have attended the American Chemical Society Summer School on Green Chemistry. Julee Driver, in 2004, and Lisette Tenlep, in 2005, were selected from a highly competitive applicant pool for the international event.

Green Chemistry can be described as a thought process broadly applicable to all chemistry disciplines. While the negative connotations associated with the term “chemical” may not be intentional, inherent risks are associated with all chemicals. These chemical risks are generally a function of the specific hazard (e.g. toxicity, safety, etc.) and exposure. Thus, green chemistry is defined as the design of chemical products and processes that reduce or eliminate the use and generation of hazardous substances.¹

“Before attending the ACS Summer School in Washington, D.C., this summer, I was not really acquainted with green chemistry,” claims Tenlep, a second-year Ph.D. student from Cameroon. “Attending the summer school changed my understanding of green chemistry. I learned that green chemistry is not just limited to the laboratory; it is also applicable everywhere, from the G8-Science Ministers to individual businesses.”

During the summer school, participants met with industry, government, and academic leaders in a series of lectures, workshops, and laboratory experiences. The Twelve Principles of Green Chemistry (see sidebar) were thoroughly examined and the students interacted with fellow graduate students while gaining an appreciation for the industrial application of chemistry.

“We have to keep in mind that chemists have it in their power to reduce or eliminate the risk posed to themselves and society in general by the chemical enterprise. Therefore choosing to do greener chemistry will be a benefit for everybody,” explains Driver, a third-year Ph.D. student from Sioux Falls. She attended the 2004 summer school at McGill University in Montreal, Canada. She went on to state, “Attending the Green Chemistry Summer School was an incredible experience. I learned that green chemistry is not a field unto itself. More appropriately, green chemistry is any chemistry practiced with consideration of safety, human health impact and environmental impact.

“The ultimate goal of green chemistry would be that all chemistry becomes green chemistry as all chemists begin to work toward eliminating hazards from chemicals and chemical processes. Throughout the summer school, there were lectures, workshops, and laboratory exercises on a wide range of topics—everything from new catalyst technologies, to biomass as a petroleum alternative, to developing energy-saving and safer chemical syntheses was discussed. The top people working in field of green chemistry were present, and it was inspiring to interact and exchange ideas with them. The most remarkable thing I learned was that businesses can profit from trying to make their processes greener.”

The summer schools, entering their fifth year in 2007, are organized by the ACS Green Chemistry Institute and receive funding from sponsors such as the ACS Petroleum Research Fund, The Johnson Family Foundation, Exxon-Mobil, and the Chemical Institute of Canada. To apply, graduate students and postdocs studying in the Americas must submit an essay on their expected involvement with green chemistry along with a letter of support from their graduate advisor. Previously, the summer school has been held at Carnegie-Mellon University in Pittsburgh and at the Universidad de la República in Montevideo, Uruguay. The 2007 summer school is tentatively scheduled for Mexico City.

In Raynie’s research, supercritical technology is being explored as an alternative to conventional liquid solvents, coupled with his background in analytical separations. Raynie has been involved with green chemistry since his tenure as an industrial research chemist at Procter & Gamble. Working with Raynie, Driver is investigating analytical methods for the characterization of antimicrobial residues in agricultural samples. Tenlep uses near-critical water and microwave irradiation to hydrolyze lignocellulosic biomass, a key component to expand production of fuel-grade ethanol.

¹Anastas, P.T.; Warner, J.C.; Green Chemistry: Theory and Practice; Oxford University Press: New York, 1998.

The Twelve Principles of Green Chemistry

1. **Prevention** It is better to prevent waste than to treat or clean up waste after it is formed.
2. **Atom Economy** Synthetic methods should be designed to maximize the incorporation of all materials used in the process into the final product.
3. **Less Hazardous Chemical Synthesis** Wherever practicable, synthetic methodologies should be designed to use and generate substances that possess little or no toxicity to human health and the environment.
4. **Designing Safer Chemicals** Chemical products should be designed to preserve efficacy of function while reducing toxicity.
5. **Safer Solvents and Auxiliaries** The use of auxiliary substances (solvents, separation agents, etc.) should be made unnecessary whenever possible and innocuous when used.
6. **Design for Energy Efficiency** Energy requirements should be recognized for their environmental and economic impacts and should be minimized. Synthetic methods should be conducted at ambient temperature and pressure.
7. **Use of Renewable Feedstocks** A raw material of feedstock should be renewable rather than depleting whenever technically and economically practicable.
8. **Reduce Derivatives** Unnecessary derivatization (blocking groups, protection/deprotection, temporary modification of physical/chemical processes) should be avoided whenever possible.
9. **Catalysis** Catalytic reagents (as selective as possible) are superior to stoichiometric reagents.
10. **Design for Degradation** Chemical products should be designed so that at the end of their function they do not persist in the environment, and break down into innocuous degradation products.
11. **Real-time Analysis for Pollution Prevention** Analytical methodologies need to be further developed to allow for real-time, in-process monitoring and control prior to the formation of hazardous substances.
12. **Accident Prevention** Substances and the form of a substance used in a chemical process should be chosen so as to minimize the potential for chemical accidents, including releases, explosions, and fires.

Alumni News

Keith A. Nelson

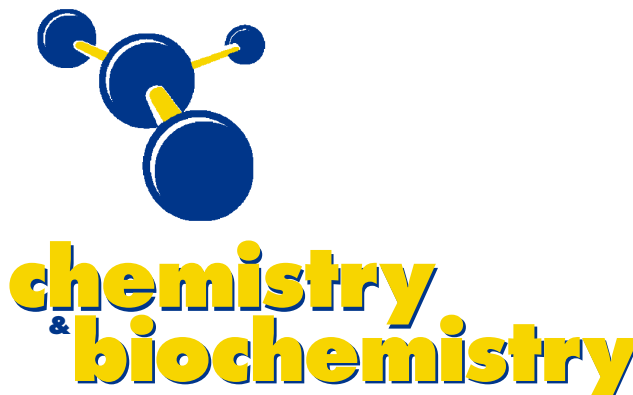
B.S. 1977

I graduated from SDSU in 1977 with a B.S. in professional chemistry and then attended grad school at the University of Utah where I received a Ph.D. in organic chemistry. I was with ExxonMobil Chemical for more than thirteen years, mostly in the Adhesive Industry Business Unit, and held various technical positions in Baton Rouge, Louisiana, and Baytown, Texas. I left Exxon-Mobil to assume my current position with Megaloid Resins Limited. MRL is a start-up company headquartered in Toronto, Canada. Quite a change going from one of the largest chemical companies in the world to one of the smallest! Nonetheless, it is a refreshing change that has given me many opportunities that I may not have had with Exxon. I will be relocating to Canada sometime in the next few months.

By the way, I was pleased to see the article on the Wadsworth Research Endowment. Bill Wadsworth was my undergraduate advisor as well as my inspiration to pursue organic chemistry. His picture brought back many memories. Did you know that Bill is colorblind? We had a lot of fun with him in the class where he introduced the concept of stereochemistry using a red, blue, green, and black ball-and-stick molecular model! All colors looked the same to him!

My e-mail address is: knelson@megaloidresins.com

Each newsletter contains information on alumni and their activities. If you would like to share something about yourself and what you are doing, please send us a note and we will include it in the next issue. You can FAX to us at (605) 688-6364, e-mail us at James.Rice@sdstate.edu, and mail is always welcome.



Alum receives brigadier general stars

Keith Corbett's life is richer these days and it comes with a shiny bright star.

In formal ceremonies on the SDSU campus July 19, the longtime SDSU educator and military man received his stars as the state's newest brigadier general.

"It's a great honor," said the one-star general, 1976 SDSU chemistry graduate. "I am so humbled by this because I certainly would never have expected this thirty years ago."

Corbett is the interim dean of the College of General Studies and is in his 30th year of military service. He graduated in 1976 with a chemistry degree and received his commission from the Air Force ROTC program.

He became a transportation officer in the South Dakota Army National Guard in 1983, working his way to the rank of full colonel in 2002, before his promotion to brigadier general.

The brigadier general rank also carries the title of assistant adjutant general for the National Guard, meaning Corbett is responsible for troop readiness, training, mobilization exercises, recruiting, and retention.

"Keith is a great person," said Maj. Gen. Michael Gorman, a two-star general whom Corbett reports to and is an officer in the governor's cabinet.

"We have a tremendous amount of great people and sometimes it's hard to pick the cream of the crop, but Keith has done everything we have asked of him over the years," he added. "We look for someone not just to reward them for his or her past service, but also what their potential is for the future and Keith will do a great job."

The energetic and personable Corbett said he has the best of both worlds with strong allegiance to SDSU, the military, and his family.

"I look forward to coming to work every single day and working with a great team of people," he said. "In addition to my own family, I have two other great families in SDSU and the National Guard."

"The National Guard has fit me so well over the years. I'm in the military and able to serve my country when called upon, but yet I can still be at SDSU, where I can shape young minds and help them grow and develop."



Silver eagles are replaced by silver stars as Keith Corbett became the South Dakota National Guard's newest general.

Corbett, 54, was born in Sioux Falls and grew up in Watertown. At SDSU, he was a chemist in the College of Engineering and later professor of military science.

After earning a master's degree in strategic leadership at the Army War College in Carlisle, Pennsylvania, in 2003, a requirement to become a brigadier general, Corbett returned to SDSU as assistant dean of general studies. He was named interim dean July 1, 2006.

For Corbett and others like him, the brigadier general process takes about a year. First, a military board in Washington, D.C., determines if candidates meet military and civilian education requirements. After approval by the president, nominees go before the Senate Armed Services Committee. They are then brought to the full U.S. Senate for final confirmation.

"What a great situation I find myself in," Corbett said. "I feel so fortunate the trust that people have placed in me. It's my intention to work with a dedicated team of people and direct them as the South Dakota National Guard continues to move forward."

by Kyle Johnson, SDSU University Relations

New Grad Students



Lei Geng

I am from China where my family still lives. My parents are farmers, and my older sister is also a graduate student in China. I attended the University of Science and Technology of China and graduated with a B.S. in 2006.

I am working for Dr. Cole-Dai and my research work is about environmental chemistry, focusing on ice core and analytic chemistry.



Curtiss Kovash Jr.

I was born and raised in Mandan, North Dakota, and earned my ACS Certified Bachelor's of Science Degree in chemistry with a minor in coatings and polymeric materials from North Dakota State in May 2006. My wife, Mandi, and I had our first child, Jeremy Payton Kovash, September 21.

I will be working in Dr. Brian Logue's lab with plans to work on luminescent up-converters and down-converters for photovoltaic cells.



Jeremy Kroon

Though I was born in Sioux Falls my father was in the Air Force so I lived in many places as I grew up, including Ellsworth AFB in Rapid City, which is where I learned about South Dakota. After graduating high school in Virginia I moved back to South Dakota and

attended Black Hills State University where I received my B.S. in chemistry.

I also found the love of my life and my fiancée and I will be married this spring. After graduating with my B.S., I went back to Virginia where I worked in an environmental laboratory for six months. This experience made me want to go back to school. I am currently here at SDSU working on my Ph.D. with Dr. Raynie as my advisor.



Alyson Lanciki

I graduated in May 2006 with a B.S. in environmental chemistry from SUNY College of Environmental Science and Forestry (SUNY-ESF) in Syracuse, New York. My interests lie in pollution analysis (mainly atmospheric). At SUNY-ESF I worked on many research projects:

accumulation of PAH's on epicuticular wax of tree leaves, city-wide mapping of Pb and 24 other heavy metals in Syracuse, a computational study of an aldol condensation, and a computational study of the reaction between acetylperoxy and hydroperoxy radicals. I also worked for a year as an environmental consultant for ERM (Environmental Resources Management) in Syracuse.

Meteorology and climate change are passions of mine, as well as photography, astrophotography, and painting/drawing. I played ice hockey for the Syracuse University Orangewomen, and was also an axe-thrower for the ESF Woodsmen's Team. I love to read and to ballroom dance.



Erin Jo Mercer

I was born and raised in the heart of Big Red Country—Lincoln, Nebraska—though I'm not an avid Huskers fan. My father, Brad, sells Morton Buildings and my mother, Patty, a 1978 SDSU grad, teaches fourth grade. I have one sister, Ashley, who is pursuing a history and

religion degree at Augustana in Sioux Falls. In May of this year I graduated with a B.A. in chemistry and American studies from St. Olaf College in Northfield, Minnesota. Having spent four years studying complexes in culture and chemistry, I'm excited to focus my work in organic chemistry. I'm working with Dr. Halaweish and intend to study liver protection activity of cucurbitacin extracts.



Ethel Ngen

I am from Cameroon where I studied general chemistry and material science Technology at the University of Buea for a bachelor's degree and inorganic and environmental chemistry at the University of Douala for a master's degree. I worked as a chemist with Exxon Mobil

until coming to SDSU. I'm majoring in organic chemistry and working with Dr. You in organic synthesis.

Tanaka endows undergrad scholarship

John Tanaka's teaching influenced many SDSU students during his seven years at the University, from 1956-63. Now, he's back with a gift that will impact many more.

The former chemistry professor, along with his wife Patty '59, has made a significant gift to support student research in his field. The award, designed for second to fifth semester students, will pay students to do research and work in the lab. "That's where the excitement is in science: to get in the labs and discover things," says Tanaka.

After forty years at the University of Connecticut, Professor Tanaka retired last spring. The SDSU program is patterned after a similar award at that university. "We've been doing it here and it's been very popular. It gets students interested in undergraduate research and it helps faculty members out," says Tanaka, whose own career accomplishments include two patents, five books and monographs and more than 250 articles and papers.

Contact with SDSU alumni—his former students—spurred Tanaka to give back to the University where his teaching career began. "Students remember me and they've said nice things. It's my way of saying, 'thanks for saying such nice things,'" he says.

One example of such a student is Distinguished Alumnus R. Craig Schnell now vice president and provost of North



Dr. Tanaka in his lab.

Dakota State University. "I was extremely impressed that he cared a lot about students. He kept the students interested in working," he says.

As a sophomore, Schnell took organic chemistry with Tanaka and served as a teaching assistant for that lab the following year. Schnell calls Tanaka a "student magnet," saying he recruited students, "without a heavy sales pitch, but just by example. If you needed help," says Schnell, "he was there to help you."

And it appears he still is.

Midwest Seeds becomes internship partner

The Department of Chemistry and Biochemistry and MidWest Seed Services (MWSS) of Brookings have agreed to cooperate in providing an educational experience that will meet the internship requirements for the Bachelor of Science degree in Clinical and Laboratory Science Industrial Specialization.

SDSU and MidWest Seeds signed an agreement to provide interns with a professional atmosphere in which they can apply academic knowledge with practice in a professional laboratory setting. They can also interact with the professional community and develop entry level competence in management, regulatory issues, and professional skills appropriate to a laboratory setting.

MidWest Seeds sees this agreement as an opportunity to contribute to the educational preparation of future laboratory professionals. They also want to develop student projects of interest to MWSS and obtain results with freedom of practice to MWSS. Interesting students in possible future employment with MWSS is a benefit too.

SDSU benefits from the availability of a professional segment to the Clinical and Laboratory Sciences Industrial Specialization Program. The department is able to utilize off-site laboratory professionals with high levels of knowledge, background, and expertise, and access a wide variety of state-of-the art instrumentation and equipment.

Students will be required to meet the requirements of the Department for an internship program. MWSS will select the student(s) to participate in the internship program under the recommendation of SDSU and instruct students in professional practice. The internship experience will be paid or unpaid at the discretion of MWSS.

Students will be required to complete 480 hours of laboratory experience at MWSS for which they will receive 12 credit hours (Chem 494) from SDSU. As a component of Chem 494, students will prepare a written report on a required laboratory project that will be graded by the internship supervisor.

The 2006/2007 Burris Lecturer leader in drug discovery

Dr. Norman Farnsworth from the University of Illinois at Chicago was honored as this year's Burris Lecturer. He is a national leader in drug discovery from natural products.

Dr. Farnsworth has been a pioneer in the development of collaborative research efforts in pharmacognosy throughout his career. He has been funded almost continuously since 1965 by the NIH, NCI, or NSF and by contracts dealing with natural drug discovery or literature surveillance projects. His original research publications number more than 500 and have established him as a botanicals expert in both the national and international communities. His honorary degrees include doctorates from the University of Paris, Uppsala University, and Massachusetts College of Pharmacy and Allied Health Sciences. He has been designated as an Honorary Professor at the University of Trujillo in Peru, the Chinese Academy of Medical Sciences, Peking Union Medical College, and the Institute for Medicinal Plant Development in Beijing. Farnsworth served as a member on the National Research Council's Committee on Comparative Toxicity of Naturally Occurring Carcinogens (1995) and Framework for Safety Assessment of Dietary Supplements (2002-2004) and as a member on President Clinton's Commission on Dietary Supplements Labels (1995-1996), and as the first vice president and second president of the American Society of Pharmacognosy. At the University of Illinois, Chicago, he has recruited and retained the largest and most active pharmacognosy research group in the United States.

Farnsworth continues to play a pivotal role in the field of pharmacognosy. He was a member of the FDA Food Advisory Committee (Dietary Supplements Working Group on Post Market Surveillance) and has been a member of the World Health Organization Expert Advisory Panel on Traditional Medicine since 1979, and has acted as director of the WHO Collaborating Center for Traditional Medicine at UIC's College of Pharmacy since 1981. He also functions as editor in chief of the NAPRALERT (Natural Products Alert) Database, a system that he established in 1975. This collection of over 200,000 scientific articles is now available online and serves as an important resource for scientists, health-care professionals, the pharmaceutical industry, and conservation groups. Most recently in 1999, Farnsworth

became director of the UIC/NIH Center for Botanical Dietary Supplements Research, one of five research centers established by the NIH Office of Dietary Supplements (ODS) and the National Center for Complementary and Alternative Medicine (NCCAM).



Dr. Norman Farnsworth during the Burris Lecture.



Department Chair Dr. Jim Rice presents Dr. Norman Farnsworth with the plaque commemorating his selection as Burris Lecturer.

New Faculty



Dr. Youngjae You is an assistant professor at the Department of Chemistry and Biochemistry, joining the faculty in August 2006. His research emphasis is in the design and synthesis of small molecules for medical and biological applications, where multidisciplinary knowledge and skills are practiced.

He was trained as a natural product and medicinal chemist for anticancer drugs. Recently, he adopted a new, exciting technique, PDT (photodynamic therapy). PDT is an emerging treatment that is highly selective and relatively nontoxic compared to current therapeutics. In PDT, the damage on tumors occurs from the combination of a small molecule (photosensitizer), oxygen, and the light of near IR range (650-800 nm). PDT has been used successfully in the clinic for various types of diseases, especially surface cancers and macular degeneration. He is developing new photosensitizers to enhance the selectivity of the treatment.

Dr. You received his B. Pharm. in 1994 from Chungnam National University, Korea, and obtained his pharmacist license in the same year. After his completion of Ph.D. study there in 2001, he went to SUNY at Buffalo for his postdoctoral training with Dr. Michael R. Detty, where he was promoted to research assistant professor in 2004. During the time, he received the postdoctoral research grant from the U.S. Department of Defense for his PDT research. He was listed as an honored member in *Who's Who in Science and Engineering* (2006-2007, 9th edition). He has published more than forty articles.

Perfecting the formula for the future of SDSU chemistry



Rina Reynolds

Have you been thinking about investing in the Chemistry Department at SDSU? No, we're not talking about an IPO, but we do have many projects that can benefit from private investment. The SDSU Foundation is dedicated to assisting alumni, friends and corporate leaders in their support of the Department of Chemistry and Biochemistry. On a daily basis, alumni and friends like you decide to become an active partner in furthering the excellence in chemistry education and research that is thriving at SDSU.

The Department will be a major benefactor of the new Science Building, an estimated \$30-million project that is expected to be completed by 2009. The project is receiving \$24 million from the state Higher Education Facility Fund. The remaining amount will need to be privately funded.

Assisting the Department in its relationships with donors is Rina Reynolds, new Foundation Development Director for the College of Arts & Science. "I have the pleasure of not only representing the needs and vision of the Department of Chemistry and Biochemistry to potential donors, but in knowing that I am able to help facilitate giving to the Department," Reynolds says. "This Department is attracting the finest faculty in the nation as well as the brightest students. There is no question that a gift in support of the Department is a solid investment with a guarantee of dividends that reach far beyond the campus." Reynolds can be reached by calling (605) 695-7378 or rina.reynolds@sdsufoundation.org.

