

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

Chemistry & Biochemistry Newsletter

Chemistry & Biochemistry

Summer 2015

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" (2015). *Chemistry & Biochemistry Newsletter*. Paper 22.
http://openprairie.sdstate.edu/chem_news/22

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.



The Avera Health and Science Center became the home of the SDSU's Department of Chemistry and Biochemistry on September 9, 2010.

Inside

Page 2

- **Prototype Detects Cyanide Poisoning in 70 Seconds**

Page 3

- **Department TAs Receive CETL Awards**
- **Li Li Ji is Lardy Distinguished Lecturer**

Page 4

- **Fulbright Scholar Uses Soil Components to Trap Pollutants**
- **2015 Graduates**

Page 5

- **ASBMB Accredits CBC's Biochemistry Major**
- **Recent Faculty Publications**

Page 6

- **Reaching Out to the Community**

Page 7

- **Faculty and Student News**
- **Alumni News**

Page 8

- **Raynie Becomes an LCGC Editor**
- **Retired Department Head Featured**

Department of Chemistry and Biochemistry

Box 2202
South Dakota State University
Brookings, SD 57007-0896

(605) 688-5151

Visit our website at:
www.sdstate.edu/chem/

South Dakota State University

Chemistry & Biochemistry

Summer 2015



Greetings from the Department!

We are well into the summer term by the time you read this. Spring was a busy time, with the department's Lardy Lectures being given, one more search completed (that's four new faculty positions in the last two years!) new faculty (will introduce you to Dr. Severine Van slambrouck in the fall newsletter), and the largest incoming graduate student cohorts in recent years. New student orientation for incoming freshman still has about three weeks to run but we already have 35 chemistry and biochemistry majors signed up for our classes.

We've been having some fun with our "Where's Jack?" contest! Jack is the SDSU mascot who's converting to a Chem/Biochem major though he's still undecided between the two! He is tagging along with our faculty and students as they pursue their research and educational activities around the world. In the past year or so he's been all over the U.S., to Antarctica, India, Turkey and he's going to Finland this fall. Follow Jack's adventures—and guess where he's been—by following him on Facebook at: <https://www.facebook.com/sdstatechembiochem>.

This newsletter again highlights some of the many other accomplishments of the department's faculty, staff and graduate students. They are a talented group of scientists and support professionals whose recognitions reflect the commitment that the department's faculty have to graduate AND undergraduate education, and the commitment of the department's staff to supporting those endeavors. We have very fortunate to have them all as members of program.

You can support their activities with your gifts to Department, and on behalf of everyone in the department, I would like to thank all of you who chose to do so this past spring. Your support is a critical part of our ability to continue to meet the needs of students, the state and the nation. One of our major gifts this past spring was generously provided by the East family who endowed two summer undergraduate research fellowships. This gift brings the number of endowed undergraduate research fellowships in the department to five, and with a newly funded NSF Research Experiences for Undergraduates (REU) site funded and funding from other grants we have 21 undergraduates working fulltime to apply what they've learned to answer research questions that have regional and national impact. We require a summer research experience of all of undergraduate majors. The East family's gift helps us ensure that all of our students receive full financial support so that they can focus all their time and effort on this experience in order to receive the maximum educational benefit from it. If you have any questions about contributing to our programs please let me know.

On behalf of everyone here in the department I hope you have a relaxing, invigorating and productive summer.

Stay in touch!

Jim Rice

Check us out on [Facebook.com/SDSU-Chemistry-and-Biochemistry-Department](https://www.facebook.com/SDSU-Chemistry-and-Biochemistry-Department)



Prototype Detects Cyanide Poisoning in 70 Seconds

A victim of cyanide poisoning can die within 30 minutes.

The test to determine cyanide exposure takes 24 hours.

According to U.S. Department of Health recommendations, “any delay to draw blood or collect urine could endanger patient welfare.” That’s why medical personnel simply treat the patient when dealing with a possible case of cyanide poisoning.

Associate professor Brian Logue has a solution—a prototype device that can detect cyanide exposure within 70 seconds. During the last 10 years, Logue has received nearly \$2 million through Department of Defense and National Institutes of Health grants to analyze cyanide and its metabolites and help create countermeasures for cyanide exposure.

Firefighters, industrial workers at risk

More than 1.5 million tons of hydrogen cyanide are produced worldwide, according to the United Nations Environment Programme. Nearly 20 percent is used to extract gold, silver and other precious metals from ore, while the remainder is used to manufacture paper, textiles and plastics, as well as for electroplating and etching metals.

When an industrial fire occurs, workers and firefighters can be exposed to cyanide, according to Logue. In addition, common building materials, such as carpet and plastics, contain cyanide that can be released when they burn.

Logue said foods, such as wild cherries, bitter almonds, peach pits and lima beans also contain high levels of cyanide.

Scientists and medical personnel identified the need for a quick, reliable and portable means of identifying exposure to cyanide, he explained, which prompted the NIH’s request for proposals.

Furthermore, according to the Centers for Disease Control and Prevention the early symptoms of cyanide poisoning including dizziness, headache, shortness of breath and rapid heart rate as well as nausea and vomiting are pretty nondescript. “That’s another part of the reason for the sensor,” Logue pointed out.

Quick diagnosis

The patent-pending sensor design uses a two-stage process—the first converts the cyanide in the sample into a gas and the second traps it in a base. “It diffuses like perfume,” Logue said. Two doctoral students have worked on the project.

The cyanide then reacts with a second substance and becomes fluorescent when exposed to light, according to doctoral student Randy Jackson. The fluorescent product containing cyanide then emits its own light, which can be measured to determine analytical concentration.



Firefighters battle a November 2014 blaze in Mitchell from the perimeter to prevent exposure to chemicals. The building contained farm chemicals and fertilizer. Photo by Matthew Gade/Mitchell Daily Republic.

The researchers have updated the sensor design, which is in its fourth version of development, and have decreased the diagnostic time from 2 minutes to 70 seconds, Logue explained. However, “we haven’t optimized it—we’d like that to be under a minute.”

Speed is essential when faced with a catastrophic situation, such as an industrial fire or terrorist attack, in which many victims need to be assessed quickly, Logue noted. In such a scenario, a blood sample from a finger prick, like a diabetic would do to measure blood sugar, could be used to determine if a person has been exposed, Jackson added.

Ultimately, the researchers would like to be able to test saliva, because typically cyanide exposure occurs through the mouth or nose, Logue explained. However, a consistent link between the two has not been established.

Accuracy, design optimization

Tests performed on rabbits were 100 percent accurate at diagnosing exposure to cyanide, even at levels 200 times lower than the lethal amount, Logue explained. The device detects cyanide levels below what a person is exposed to when smoking a cigarette.

A baseline blood test was done prior to exposure and then blood was drawn at 15-, 25- and 35-minute intervals as the animals were gradually exposed to low concentrations of cyanide, according to Jackson. Even at the earliest time interval, the device could detect increased cyanide levels.

Logue plans on conducting larger animal studies to statistically determine sensor accuracy. “We’re pretty confident the device is accurate diagnostically because the specificity of the reaction is very good.”



Associate professor Brian Logue observes doctoral student Randy Jackson filling the wells in the cyanide sensor cartridge with chemical reagents—an acid, a base and a fluorescent agent. Each cartridge can determine the cyanide level in a sample of either blood or water.



Inset: The blood sample is placed inside the cartridge. Once the cartridge is inserted in the machine, it will determine the level of cyanide in the blood sample in approximately 70 seconds. This device will help emergency personnel quickly identify patients who have been exposed to cyanide.

In addition, the researchers will tap engineering expertise to miniaturize the device and will optimize the replaceable cartridge that contains the reactive chemicals. Eventually, the device must be approved by Federal Drug Administration.

Logue has begun the search for a business partner with whom he can apply for Small Business Innovation and Research (SBIR) funding to refine and market the device. “I want to get this product to the people to help save lives.”

Public Radio interview

A post-doctoral student on the project, Randy Jackson, was interviewed on South Dakota Public Radio, where he explained that multiple prototypes have been constructed and that Logue’s team is currently working on miniaturizing the sensor for portability. You can listen to his interview at listen.sdpb.org/post/cyanide-detection.

Department TAs receive CETL Awards



Chemistry and Biochemistry TAs were out in full force at the Center for Excellence in Teaching & Learning (CETL) award ceremony on May 1. These department TAs received the Graduate Teaching Certificate of Excellence and/or Graduate Teaching Certificate of Highest Excellence, (front) Osa Andrews, Tommy Cox and George Gachumi and (back) Daniel Boamah, John Kiratu, Tobi Odeleye and Cyndey Johnson-Edler.

Li Li Ji is Lardy Distinguished Lecturer



The 22nd Henry A. Lardy Distinguished Lecture Series in Chemistry at SDSU featured Dr. Li Li Ji, professor and director of the School of Kinesiology at the University of Minnesota-Twin Cities since 2011. The Lardy Lecture is made possible by an endowment provided by Dr. Lardy and wife, Annrita.

Dr. Ji received his M.S. and Ph.D. from the University of Wisconsin-Madison in 1982 and 1985, respectively, specializing in exercise physiology. His doctoral and post-doctoral training were under the mentorship of Dr. Henry Lardy at the Institute of Enzyme Research at UW-Madison.

Dr. Ji’s research focuses on cellular and molecular exercise physiology, especially the role of free radicals and antioxidants in muscle function, adaptation, pathogenesis, signaling and aging.

Dr. Ji delivered two lectures — Exercise in Medicine: Role of Free Radicals and Antioxidants and Role of Redox Signaling in the Consequences of Muscle Activity and Inactivity in April.

Fulbright Scholar Uses Soil Components to Trap Pollutants

Using natural soil components to trap pollutants will allow producers to control soil contaminants and reuse draining water while protecting their agricultural crops, according to Mohamed Elsayed, a Fulbright Postdoctoral Scholar at South Dakota State University's chemistry and biochemistry department.

Elsayed, a researcher from the Soil Water and Environmental Research Institute at the Agricultural Research Center in Egypt, presented his work at the American Chemical Society National Meeting March 22-26 in Denver.

"I am honored that Mohamed chose my group as the place to spend his fellowship," said Jim Rice, head of SDSU's Department of Chemistry and Biochemistry. "It's another sign of the strong international recognition that our research program is building."

If crops are sown in polluted soil, the plants absorb the contaminants, Elsayed explained. These are then transferred to humans when they consume the vegetables or grains.

Because of water shortages in Egypt, Elsayed said, "we need to use water again and again, but before we reuse it, we need to clean it."

His research seeks to increase the ability of humic acid to adsorb or trap pollutants in combination with either of two clay minerals—kaolinite or montmorillonite. Humic acid is one of the major organic components in soil and is also used as fertilizer.

"The idea is to use natural materials to reduce the pollutants," he explained. "Natural components are cheaper, more easily available." Plus, artificial ingredients run the risk of adding to the pollution problems—natural ingredients don't.

By breaking humic acid into smaller molecules, a process called fractionation, Elsayed hopes to improve the interaction between humic acid and clay minerals and, therefore, their ability to trap pollutants, particularly heavy metals. This project is a continuation of his doctoral research.

If fractionation produces good results, the next step will be to determine the optimum humic acid fractionation combination for each clay mineral to enhance the trapping process, Elsayed explained.

The long-range vision is for producers to apply humic acid, either in solid or liquid form, to enhance soil properties.

"These compounds would capture the heavy metals and organic pollutants so the plant won't take it up," he said. The resulting crop would be contaminant-free.



Mohamed Elsayed, a Fulbright Postdoctoral Scholar concentrates some humic acid fractions by evaporating the water. His research seeks to use natural soil components to trap pollutants and allow producers to irrigate their crops with recycled drainage water.

Below, Elsayed uses ultrafiltration techniques to break humic acid down into smaller molecules that can then combine with clay minerals in the soil to trap pollutants.



2015 Graduates

Graduate:

Abdulrhman Alsayari, Ph.D., George Gachumi, Ph.D., Randy Jackson, Ph.D. and Brandon Scott, Ph.D.

Chemistry:

Jiwoo An and James Cassidy

Biochemistry:

Shimara Gunawardana and Scott Splett

ASBMB Accredits CBC's Biochemistry Major

The American Society of Biochemistry and Molecular Biology has accredited the South Dakota State University's undergraduate biochemistry major for a full seven-year term, effective June 1, 2015. It is the maximum time currently allowed under the group's guidelines. South Dakota State is one of 30 colleges and universities to have achieved accreditation.

The major, which started in fall 2006, currently has 43 students enrolled.

"What does accreditation mean to students? It shows you have a biochemistry major that is current with respect to the discipline's understanding of what is state-of-the-art," said Jim Rice, the department head. "The things we want students to be proficient in when they graduate are concept understanding and application of techniques that graduate schools, professional schools and industry need incoming students or employees to have. "That is important because it gives the students confidence what they're doing here is going to allow them to do whatever they want to do when they leave here."

South Dakota State submitted its application in October 2014. Rice said the notification letter stated the program has excellent faculty, outstanding teaching and research, a strong interdisciplinary curriculum and modern facilities.

Rice said students can tailor a biochemistry major to specialize in a certain program.

"One of the reasons that the molecular sciences, both chemistry and biochemistry, are such great majors is that they're so foundational to just about any science, technology or engineering field. You can use them as springboards to an incredible number of career paths," he said. "It's a dynamic discipline and our accredited curriculum reflects that."



Scan this code with your smartphone to go directly to the latest departmental news and announcements.

Recent Faculty Publications

Jihong Cole-Dai

WAIS Divide Project Members, C. Buizert, and 50 others including J. Cole-Dai (2015), Precise inter-polar phasing of abrupt climate change during the last ice age, *Nature*, 520, 661-665, doi:10.1038/nature14401.

Fitzpatrick, Joan J., Donald E. Voigt, John M. Fegyveresi, Nathan T. Stevens, Matthew K. Spencer, Jihong Cole-Dai, Richard B. Alley, Gabriella E. Jardine, Eric D. Cravens, Lawrence A. Wilen, T.J. Fudge, Joseph R. McConnell (2014), Physical properties of the WAIS Divide ice core, *Journal of Glaciology*, 60, 1181-1198, doi: 10.3189/2014JoG14J100.

Geng, Lei, Becky Alexander, Jihong Cole-Dai, Eric J. Steig, Joël Savarino, Eric D. Sofen, and Andrew J. Schauer (2014), Nitrogen isotopes in ice core nitrate linked to anthropogenic atmospheric acidity change, *Proceedings of the National Academy of Sciences*, 111, 5808-5812, doi:10.1073/pnas.1319441111.

Geng, Lei, Jihong Cole-Dai, Becky Alexander, J. Erbland, Joël Savarino, Andrew J. Schauer, Eric J. Steig, Pu Lin, Qiang Fu, and Maria G. Zatzko (2014), On the origin of the occasional springtime nitrate concentration maximum in Greenland snow, *Atmospheric Chemistry and Physics Discussion*, 14, 13361-13376, doi: 10.5194/acp-14-13361-2014.

Surtaaj Iram

Iram SH, Gruber SJ, Raguimova ON, Thomas DD, Robia SL, ATP-Binding Cassette Transporter Structure Changes Detected by Intramolecular Fluorescence Energy Transfer for High-Throughput Screening. *Mol Pharmacol*. 2015 Jul;88(1):84-94. doi: 10.1124/mol.114.096792. Epub 2015 Apr 29.

Brian Logue

Kofford J.C., Manandhar E., and Logue B.A. (2015) Quantitative Hands-on Gas Chromatography Undergraduate Analytical Laboratory Exercise. *Journal of Laboratory Chemical Education* 3(1), 12-17 (<http://dx.doi.org/10.5923/j.lce.20150301.03>).

Mallam V., Elbohy H., Qiao Q., and Logue B.A. (2015) Investigation of Novel Anthracene-Bridged Carbazoles as Sensitizers and Co-Sensitizers for Dye Sensitized Solar Cells. *International Journal of Energy Research*, published online. (<http://dx.doi.org/10.1002/er.3331>)

Meruga J.M., Kern J., Petersen J., Logue B.A., Baride A., May P.S., Cross W.M., Crawford G., Tamayo D., Richards J. and Kellar J.J. (2015) Innovative Security Applications using Direct-Write Printing. *Keesing Journal of Documents & Identity*, Issue 47, June 15.

Lefanova A., Nepal J., Poudel P., Davoux D., Gautam U., Mallam V., Qiao Q., Logue B.A., Farrokh Baroughi, M. (2014) Transparent platinum counter electrode for efficient semi-transparent dye-sensitized solar cells. *Thin Solid Films* 562, 578-584 (<http://dx.doi.org/10.1016/j.tsf.2014.03.075>).

Reaching Out to the Community

Department hosts area Boy Scouts



Webelos from Den 5, Pack 4 at First Lutheran Church get a tour of a chemistry lab in the Avera Health and Science Center from Dr. Fathi Halaweish, professor of chemistry, at SDSU. Pictured at the March 11 tour are, from left, Colton Stabough, Christopher Gross, Joshua Park (behind Gross) and Dawson Gross. The one-hour tour preceded an all-day workshop for planned for Brookings Boy Scouts on April 18.

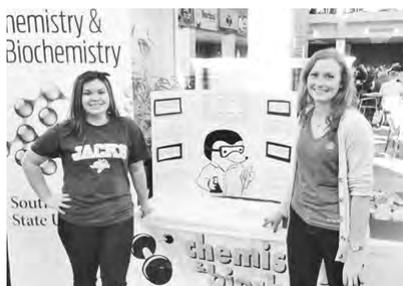


Thomas Reed builds a solar cell using fresh blackberries and semiconductors when the SDSU Department of Chemistry and Biochemistry hosted 17 Boy Scouts April 18. The scouts also participated in activities and discussions on energy efficiency, energy conservation, jobs in the energy industry and home energy audits. Boy Scouts belonging to five Brookings troops and one from Marshall, Minn., earned energy merit badges. The event was supported by a National Science Foundation grant through the South Dakota Experimental Program to Stimulate Competitive Research (EPSCoR) office.

ACS Student Affiliate Chapter Activities



More than 50 people attended the Spring SA-ACS department picnic.



ACS members Jenna Soukup and Laura Dirks promoting Mole Day by giving out free cookies in the union.



Department guest speaker Dr. Harriet Okatch from the University of Botswana with Dr. Grove.



Several members of SDSU's Student Affiliate Chapter of the American Chemical Society, took a trip to the Children's Museum in Brookings to do chemistry-related demonstrations and activities with groups of children. Stad Ziegler is pictured showing kids how to propel a skateboard using Diet Coke and Mentos. Photo by Makenzie Huber, courtesy of the *Collegian*.

Faculty and Student News

To Set Honors Credits record

Gabriel Sexton is a senior biochemistry major from Brookings. In addition to academic, research, co-curricular and community achievements, Gabe will have completed 52 Honors credits—an all-time record when he graduates this spring.

Undergraduate Cancer Research

Jeremiah Atkinson is a junior biology and biochemistry pre-med student from Ramsey, Minnesota. His colon cancer research has been presented at the local, regional and national levels. Jeremiah has conducted research with faculty scientists at the University of Illinois, Chicago. He has served as treasurer and secretary for the Honors College Student Organization, as an Admissions Ambassador, Community Assistant and as a teaching assistant for Honors Orientation.

ESDSEF Biochemistry Award



Austin Buchholz, a Waverly/South Shore High School student, won the Chemistry/Biochemistry award at the Eastern South Dakota Science and Engineering Fair which SDSU hosts every spring. The abstract of his winning project follows:

“For my project, I tested whether Native Americans or Caucasians would have a higher tasting percentage of the chemicals PTC, sodium benzoate

and thiourea, all of which are related. I came up with this project when we visited the Sanford Research Lab in Sioux Falls for a science class. While there, we performed this lab test for those within the class, and I wanted to see if the lab could be used elsewhere. I hypothesized that the Native American group would have a higher tasting percentage for all three chemicals.

To test this, I had each test subject perform a paper taste test. Subjects tried three different kinds of paper, each containing one of the three chemicals. After they had done this test and I recorded the results, I proceeded to take a saliva sample from each subject. This saliva was used to map the DNA ladder of each subject for the PTC tasting gene, following lab instructions provided by Sanford Releaser. After performing the saliva sample test, I graphed the results of the paper tests and took pictures of the electrophoresis gel containing the DNA ladders.

I found that the Native American group had a higher tasting percentage of the PTC chemical, but contained a lower percentage for sodium benzoate and thiourea. Notably, every subject tested in the Caucasian group could taste the thiourea. I have concluded that although Native Americans have a higher percentage for PTC, Caucasians have a higher percentage for the other chemicals.

Alumni News

Gregory Pazour, Ph.D., *BS Chemistry and Biology 1983*

Gregory J. Pazour, Ph.D., professor of molecular medicine, UMass Medical School, received the 2015 Lillian Jean Kaplan International Prize for Advancement in the Understanding of Polycystic Kidney Disease (PKD), for his discovery of the role cilia dysfunction plays in the disease.

“The Kaplan Prize, which is the most prestigious prize in the polycystic kidney field, is a long-overdue recognition of Greg’s enormous impact,” said George B. Witman, Ph.D., the George Booth Chair in the Basic Sciences and professor of molecular, cell & cancer biology at UMass Medical School. “Greg’s pioneering studies demonstrating the connection between cilia and PKD provided the foundation for much of the work done in the field over the last decade.”

PKD is a one of the most common life-threatening genetic disorders in the world, affecting an estimated 12.5 million people.

An expert in cilia function and assembly, Pazour was the first to draw an unexpected link between cilia dysfunction and PKD.

He received his Ph.D. in biochemistry from the University of Minnesota in 1991 and an undergraduate degree in chemistry and biology from SDSU.

Col. Evan Renz, M.D., *BS Chemistry 1983*

Col. Evan M. Renz, M.D., assumed command of Brooke Army Medical Center in October 2014. He earned both his B.S. in chemistry and his commission in the Medical Service Corps officer through ROTC at SDSU in 1983. His first duty assignment was to the 82nd Airborne Division as a Platoon Leader in 325th Infantry followed by assignments as Company Executive Officer, Battalion Operations Officer, and Company Commander within the 307th Medical Battalion.

In 1990, he was transferred to the Uniformed Services University of the Health Sciences where he served in the Department of Military and Emergency Medicine and with the Counter Narcotics Tactical Operations Medical Support task force in support of Federal law enforcement agencies.

Col. Renz earned his M.D. at Sanford School of Medicine at USD and completed his residency in general surgery at William Beaumont Army Medical Center. In 2003, he was assigned to the U.S. Army Institute of Surgical Research serving as chief of the Army Burn Flight Team and assistant director; between 2008-2013 he served as the chief of the Clinical Directorate and director of the Burn Center leading in the design and transition into the sole burn center in the Department of Defense.

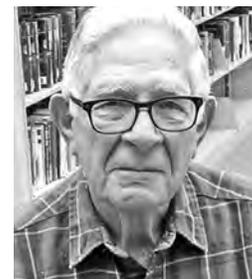
Col. Renz has also served overseas in Egypt, Honduras, Iraq and Afghanistan.

Raynie Becomes an LCGC Editor



Research associate professor Doug Raynie supervises sophomore pharmacy major Madeline Walder as she prepares a sample of soybean oil for accelerated solvent extraction. In January of this year, Raynie became the Sample Preparation Perspectives editor for the journal *LCGC North America*. He replaces Ron Majors, who began the column 25 years ago. In addition to writing the monthly column, he will serve on the editorial advisory board. "I'm honored to be named an editor and columnist for *LCGC*. Not only is this a recognition of my professional accomplishments, but I will be able to share with others my knowledge and experience in an important and often overlooked step in chemical analysis," said Raynie.

Retired Department Head Featured



Harry Hecht, chairman of the SDSU Chemistry Department from 1900-1900, was featured in the *Brookings Register* in December 2014. Since taking up woodcarving 30 years ago, Dr. Hecht has become a skilled and avid carver. Dr. Hecht's carvings were on display at the Brookings Public Library at the time of the Register article which detailed his style and method of carving. Photo by John Kubal, courtesy of the *Brookings Register*.

0000 copies were printed by the Department of Chemistry and Biochemistry at \$0.00 each. Printed on Recycled Paper. CH 024 7/15

Where are you? What are you doing?

We gladly publish updates on our alums' careers and lives — if we receive them. It's a great way for all of us to keep in touch!

If you would like to share something send us a note and we will include it in the next issue. You can also fax us at (605) 688-6364, or email us at James.Rice@sdstate.edu.

RETURN SERVICE REQUESTED

South Dakota State University and Biochemistry
Department of Chemistry and Biochemistry
Box 2202
Brookings, SD 57007-0896



NON-PROFIT ORG
US Postage Paid
Brookings, SD
Permit 24