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Chemistry & Biochemistry Newsletter

Chemistry & Biochemistry

Spring 2003

Chemistry & Biochemistry Newsletter

Department of Chemistry & Biochemistry, South Dakota State University

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South Dakota State University

Chemistry & Biochemistry

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Message from the Department Head



It has been a busy spring semester!

The relocation of the Olson Biochemistry Laboratory to Shepard Hall (while their permanent home in the Animal Science Complex is renovated) has been accomplished. There isn't much free space left in Shepard Hall, but we are all getting along famously.

We completed our seven-year Board of Regents program review. While the academic program was last reviewed in 1999, this was the first time that the academic program and the Agricultural Experiment Station were reviewed together. This is an important step because it further integrates all of the department's activities. The faculty completed an extensive self-assessment, and an eight-member review team spent three days in the department evaluating it. We have just received their report, and I will be talking more about it in the Fall 2003 newsletter.

We have hired a new faculty member, Dr. David Cartrette. Dr. Cartrette received his Ph.D. from Purdue in Chemical Education and will join the department's growing research emphasis in this area. We will introduce you to him in the Fall newsletter.

Finally, I have just received word that an ~\$1 million proposal that we had submitted to the EPSCoR MRI program has been funded to create a core campus mass spectroscopy facility. Using these funds, we will purchase a MALDI-TOF mass spectrometer, an ultra-high resolution electrospray ionization FTMS, and some support equipment. We will also renovate a large portion of the basement in new Shepard Hall to create a mass spectroscopy facility comparable to what we have done with our NMR facility. Again, there will be more on this in the Fall newsletter.

As commencement approached and another senior class prepared to graduate, I was reminded of the many individuals who have passed through the Department of Chemistry and Biochemistry over the years – and of the important work we do as educators. By laying the foundation for lifelong careers in critical fields, the department makes a significant impact on our students' lives and on the world.

I hope that you share my belief in the work of the department and will consider participating in our efforts to build our programs. A number of our alumni are already supporting the department, and I am happy to report an increase in giving to the department over the past calendar year to underwrite student awards and scholarships. We are currently working to increase the number of annual student awards, improve student computer access, continue to purchase major equipment, for research and instruction, and enable greater student participation in national meetings. By making a donation to the department, you will help guarantee that current and future students' needs are met.

Thank you for your continued contact with the department. I encourage you to pay us a visit next time you are on campus, or call me if you have any questions.

Stay in touch!



2003 Graduates

Amber Buckley (B.S. Chem in May '03) Major in Chemistry; minor in Criminal Justice

Erin Dewell (B.S. Chem in May '03) Major in Clinical Laboratory Technology; minor in Chemistry & Zoology

Jennifer Froke (B.S. Chem in May '03) Major in Clinical Laboratory Technology; minor in Chemistry

Thomas German (B.S. Chem in May '03) Major in Chemistry (ACS certified); minor in Biology

Desiree Lone Elk (B.S. Chem in May '03) Major in Chemistry

Jeff Nolz (B.S. Chem in May '03) Majors in Chemistry, Biology, and Microbiology; minor in Communication Studies and Theater

Heather Reddig (B.S. Chem in May '03) Major in Clinical Laboratory Technology; minor in Chemistry.

Bonnemann Scholarship in Medical Technology Awarded

Joseph J. And Coral (Coffey) Bonnemann have endowed the Bonnemann Scholarship in Medical Technology in the department. The scholarship is for a junior-level student who maintains a minimum GPA of 3.0 and is majoring in Medical Technology. The scholarship will be awarded for the first time in the Fall 2004 semester.

Joseph J. Bonneman and Coral (Coffey) Bonnemann are natives of Huron, SD. Joe graduated from Huron High School in 1945, started college at SDSU, and then spent time in the Army in the late 1940s, before returning to school. After earning a B.S. degree in Agronomy (now Plant Science) in 1951, Joe was employed at the USDA-ARS experiment station near Newell, SD. He returned to the SDSU campus in 1961 to begin a long career supervising the Crop Performance Testing program, a joint effort between the Plant Science Department and the SDSU Agricultural Experiment Station (AES). The program used farmer-cooperators and AES facilities growing replicated trials of small grains, hybrid corn, grain sorghum, soybeans, alfalfa, etc. Joe retired in 1992. He also completed work for his M.S. in Agronomy in 1964, a summer-school graduate of the first graduating class of SDSU.

Coral Ellen Coffey Bonnemann graduated from Huron High School in 1949. She earned a B.S. degree in Medical Technology from SDSU in 1953 and practiced that during employment in Rapid City and Belle Fourche, SD. She served on the board of directors of the Brookings Hospital and Brookview Manor, 1972-89, including terms both as secretary and president. She was active in matters of hospital governance on the state and national levels for over ten years during that time.

The Bonnemanns have three children. Barbara, SDSU '79-pharmacy, is Director of Pharmacy at Northwest Iowa

Health Center, Sheldon, IA. Howard, SDSU BS '82/MS '84-dairy manufacturing, SDSU '87-chemistry, is manager of the SDSU Dairy Plant and instructor in Dairy Manufacturing; and Brenda, a graduate of Northern State, is an elementary teacher at Mitchell, SD.

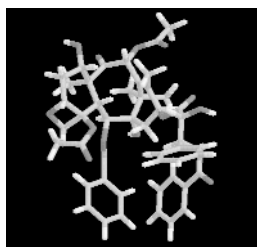
Dean's List—Spring 2003

Sarah Cady, Senior, Chemistry, Mathematics
Angela Carlson, Senior, Chemistry, Biology
Holly Donnelly, Sophomore, Chemistry
Amanda Dupay, Junior, Chemistry
Thomas German, Senior, Chemistry
Jon Hansen, Sophomore, Chemistry
Leslie Harer, Junior, Clinical Lab Technology (CLT)
Benjamin Heitz, Sophomore, Chemistry
Erin Holzwarth, Sophomore, CLT
Patrick Kappel, Freshman, Chemistry, P-Engineering
Kelly Kyro, Senior, Chemistry
Angela Landsman, Freshman, Chemistry, P-Pharmacy
Katie Louwagie, Junior, CLT
Alexia Madson, Junior, CLT
Kristin Marquardt, Junior, Chemistry
Darci Nelson, Sophomore, Chemistry
Jeffrey Nolz, Senior, Chemistry, Biology, Microbiology
Kari Nygaard, Junior, CLT
Dana Ries, Freshman, Chemistry
Kim Schlimgen, Sophomore, CLT
Marit Serck, Freshman, Chemistry
Brian Sieben, Junior, Chemistry
Matthew Small, Freshman, Chemistry,
Mathematics, Physics
Courtney Wettlaufer, Freshman, Chemistry, P-Med
Whitney Wettlaufer, Freshman, Chemistry, P-Med

Update of Sophomore Organic Chemistry Lab

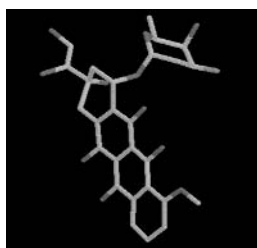
The undergraduate laboratory course in organic chemistry has undergone a number of significant changes during the past decade. Some of the motivating forces behind these changes arise from concern about the effects of chemicals in the environment, the increasing costs of chemicals used in the laboratory, and costs associated with their safe disposal. In response to these concerns, most experiments are now performed on reduced scales according to procedures that are commonly termed “microscale.”

The Department updated the organic lab last summer with equipment and instrumentation at a cost of approximately \$80,000. We have added six rotary evaporators, an FT-IR, a polarimeter, two High-Performance Liquid Chromatographs (HPLC), six microwave units, updated six gas chromatography units, and purchased computers and software for every lab station.

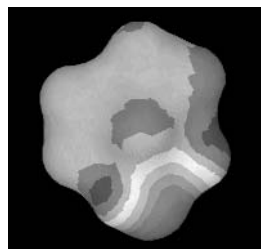


New experiments for the sophomore organic lab have been carefully selected to introduce modern laboratory techniques, such as microwave and solid-phase synthesis experiments, and to illustrate the chemistry of a wide range of functional groups that are present in organic molecules. Some experiments are designed to familiarize students with the energetic principles associated with chemical reactions. A number of experiments that involve discovery-based and green chemistry approaches are also included.

A Molecular Modeling facility has also been established in the lab. The facility included 16 PC Pentium IV computers, all connected to the network. The facility includes a smart class room visualization unit and display board. ChemOffice 2002 and Organic Reaction Animation software were used as the main software tools for molecular modeling in the facility. Students were able to use the facility to visualize Material Safety Data Sheets (MSDS) for all chemicals used in the lab and for NMR simulations. Electronic copies of *Merck Index* were also used for validating compound data.



Molecular modeling has been completely integrated into the lab curriculum in both the Honors and Chemistry Majors sections, and in a limited capacity in the general sections of Chem 326L/328L. Early introduction of molecular modeling in the lab curriculum helps students



to better use resources provided by publishers of our current textbook. Students have indicated that using molecular modeling helped them to understand the subject better. Chem 326L/328L Honors/Majors were introduced to molecular modeling in two ways. The

first approach was project oriented experiments where students conducted a lab experiment one week and followed it by molecular modeling in the next week. The second approach was to compare molecular modeling with lab work. Both approaches have been well received.

Halaweish Receives Governor's Grant



South Dakota Governor Mike Rounds has awarded nearly \$500,000 to nine faculty-led projects at the state's public universities. The grants will fund the redesigning of specific courses and encourage collaboration among the state's higher education institutions. The projects will use teams of two or more universities in order to improve student learning and reduce costs of course delivery. “These grants will encourage further efficiencies and collaboration within the public university system. At the same time, the program also supports the continuing integration of technology within the higher education curriculum,” said Governor Rounds.

Twenty-two higher education faculty members will receive the grants, including Dr. Fathi Halaweish, Associate Professor of Chemistry and Biochemistry. Dr. Halaweish will work with Dr. Grigoriy Sereda from the University of South Dakota to integrate molecular modeling software into Organic Chemistry (Chem 326 and 328) to represent the appearance of molecules and model their physical behavior.

This project builds on the approximately \$80,000 invested by the Department in the organic chemistry lab programs during the past two years for laboratory computers and equipment. The course web page is learn.sdstate.edu/HalaweishF.

A Mini-sized Antarctic in Shepard Hall!

Construction and testing of a twenty-by-ten foot walk-in freezer were completed last fall. The freezer, or “cold lab,” is part of the ice core and environmental chemistry lab (ICECL) in the Department of Chemistry and Biochemistry. It is used for two main purposes: ice core and snow samples from Antarctica are stored here, and it is a “cool” place to do experiments on the chemistry of ice.

The ICECL group, headed by Dr. Jihong Cole-Dai, studies the atmospheric environment and its history by looking at the chemistry of snow and ice preserved in the Antarctica ice sheet. Snow flakes carry chemical components of the atmosphere as they fall. Since the temperatures in Antarctica never rise to the melting point of water, the snowfall accumulates continuously, year after year. The history of the atmospheric chemical composition is therefore buried or archived in the Antarctic ice sheet. Samples of the archives are obtained with mechanical drills that penetrate the ice and bring up cylinders of ice, called ice cores. The age of snow or ice layers can be a few years to a few hundred thousand years, depending on the depth ice core sam-



An interior view of the cold lab showing stored ice core samples and saw for preparing samples.

analysis. The ICECL cold lab is kept at a constant temperature of -20°C . This is not as cold as most Antarctica is during the polar winter (temperature at the South Pole dips to -80°C in the winter and rises to about -30°C in the summer), but cold enough that the chemical composition of ice will be preserved. How cold is -20°C ? Your hands and feet begin to hurt after about 30 minutes in the cold lab, even when you wear gloves and closed-toe shoes. And the compressor fans are on constantly, making the windchill in the freezer much worse than -20°C ! To other occupants of Shepard Hall, we look quite silly in boots, hats, gloves and parkas when it is t-shirts and shorts weather.

Since the freezer was put in use last fall, about 200 meters of ice cores from three locations in Antarctica have been moved from their previous storage place, the National Ice Core Lab in Denver, into the ICECL freezer, and the research group has been busy cutting the cores into samples (“ice cubes”) for chemical analysis in the group’s analytical lab. Besides using the cold lab for sample preparation, the group also plans to put instruments there this summer, in a National Science Foundation funded project to build a chemical analyzer that will work directly on ice.



Exterior of the twenty-by-ten foot walk-in freezer in the ice core and environmental chemistry lab (ICECL).

ples come from. The age of each layer can be accurately determined, with a variety of dating techniques. This gives ice cores their best attribute to study the Earth’s past: each piece of information, whether it is about atmospheric composition or climate conditions, carries a time stamp represented by the age of the ice layer. When the pieces are put together, studying the changing atmospheric environment is like watching a movie. Ice cores can tell us many things about the atmospheric environment, from climate changes to the evolution of greenhouse gases, from huge volcanic eruptions to human impact on atmospheric composition.

Once melted, the chemical composition of Antarctica ice samples could change. So ice cores should be kept frozen until it is time to determine their chemical composition by



Hats and parkas are standard attire winter and summer in the ICECL freezer.

Alumni News

James Childs (B.S. 2002)

“After graduation in May 2002, I searched very extensively for a job in pharmaceutical industry. I am excited to announce that I accepted a position with Bristol-Myers Squibb Pharmaceuticals in Rapid City, SD, as a Territory Business Manager.

The territory that I am assigned covers from Chamberlain, SD; west to Sheridan, WY; and from the southern border of South Dakota to Hettinger, ND.

I am presently assigned the cardiovascular product line from BMS including: Pravachol, Plavix, Coumadin, and Monopril.”

Each newsletter will contain 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.

Foundation Donors

from July '02-February '03

Larry and Christine Boever
 Peter and Nancy Thiex
 Edgar P. Painter
 Cathy and John Santini
 Henry and Annrita Lardy
 John and BennaBee Duerre
 Martin Johnson
 Paul and Pamela Quin
 Donald McRoberts
 Karen Olson
 Pfizer Inc. Consumer Healthcare
 Paul Palmer
 Stephanie Russo
 David and Nancy Schueffner
 Derald and Barbara Hughes
 Ryan Scarborough
 John Yuchu Lee

Faculty and Staff News

Faculty

Harry Hecht

Dr. Harry Hecht, Professor Emeritus and former department head, recently published an article in *Chemical Heritage* (2002, 20:2, 24-28) entitled “Butyl Alcohol is Futile Alcohol—Or is it?” Dr. Hecht was the 2001 Societe de Chimie Industrielle (American Section) Fellow at the Chemical Heritage Foundation.

If anyone would like a copy of the article, please contact the department and we would be more than happy to send a copy.

Staff

Dalles Gaters

Laboratory Technician



Dalles works with Terri Van Eden and Nancy Anderson in the Olson Biochemistry Lab, specializing in minerals and selenium.

She is married and lives near Elkton with her husband, David. She has three children: Shawna, Christopher, and Taylor. Shawna and her husband, Chad, have two children and live in Papillion, Nebraska.

Dalles has nine horses, loves being outside and taking care of her animals.

Zelda McGinnis-Schlobohm

Sample Custodian



Zelda began working at Olson Biochemistry Lab in October 2002. She is the sample custodian and her responsibilities include sample check-in, sample disposal and sample distribution to the chemists.

Zelda is an '83 SDSU graduate with an Animal Science major and Chemistry minor. She is married, has a 14-year-old son, and lives on a small acreage south of Aurora.

Retirements

Renata Wnuk



We would like to congratulate Renata Wnuk on her retirement after almost 28 years with SDSU. Until the end of April, Renata was an important part of Analytical Services which operates under the direction of Nancy Thiex.

More importantly, we enjoyed having Renata in our days; she will be missed. We wish her the best of luck and fantastic success(!) in everything that she will now devote her interests to.

Recent Faculty Publications

Don Evenson

Perreault, S.D., R.J. Aitken H.W.G. Baker, D.P. Evenson, G. Huszar, D.S. Irvine, R.A. Morris, W.A. Robbins, D. Sakkas, M. Spano, and A.J. Wyrobek. (2003) Integrating new tests of sperm genetic integrity into semen analysis: Breakout group discussion. In: B. Robaire and B.F. Hales (eds.). *Advances in Male Mediated Developmental Toxicity*. Kluwer Press, New York. 253-268.



Evenson

Fathi Halaweish

Abel-Halim, O.B., Abel-Fattah, H. A., Halaweish, F.T., and Halim, A. F. Isoflavonoids and alkaloids from *Spartidium saharae*, *Nat. Prod. Sci.*, 6, 198-192, 2000.

Halaweish, F.T., Rice, J.A. and Kronberg, S. Toxic and aversive diterpenes from *Euphorbia esula*, *J. Chem. Ecol.*, 28, 1599-1611, 2002.

Zhang, D. and Halaweish, F.T. Isolation and identification of Foetidissimin: A novel ribosome-inactivating protein from *Cucurbita foetidissima*, *Plant Science*, 164, 387-393, 2003.

Halaweish, F.T., Rice, J.A. and Kronberg, S., New aversive flavonoids from *Euphorbia esula*, *J. Chem. Ecol.*, 29 (5), 1049-1058, 2003.



Halaweish

James Rice

Halaweish, F.T., Kronberg, S., Hubert, M.B., Rice, J.A. 2002, Toxic and aversive diterpenes of *Euphorbia esula*, *J. Chem. Ecol.*, 28: 1599-1611.

Shang, C., Rice, J.A., Eberl, D.D., Lin, J.S. 2003, Measurement of the illite fundamental particle thickness using a direct Fourier transform of small-angle x-ray scattering data, *Clays & Clay Minerals*, 51: 293-300.

Tremblay, L., Kohl, S.D., Rice, J.A., Gagné, J.-P. 2003, Sorption of PAH to particulate humic substances and impact of lipid content IN *Humic Substances: Nature's Most Versatile Materials*, *Proc. International Humic Substances Society*, 11th International Meeting, Boston, MA, Taylor & Francis.

Halaweish, F.T., Rice, J.A. and Kronberg, S. New aversive flavonoids from *Euphorbia esula*, *J. Chem. Ecol.*, 29 (5), 1049-1058, 2003.



Rice

Jay Shore

Prasad, P. Zhao, J. Huang, J. J. Fitzgerald, and J. S. Shore. Niobium-93 MQMAS NMR spectroscopic study of alkali and lead niobates. *Solid State Nuclear Magnetic Resonance* 19, 45-62 (2001).



Shore