Fall 2002

Chemistry & Biochemistry Newsletter

Department of Chemistry & Biochemistry, South Dakota State University

South Dakota State University

Chemistry & Biochemistry

Inside

Message from the Department Head

On behalf of the faculty and staff, I would like to welcome you to the first edition of the department's newsletter. We hope that this will be a semi-annual view into our successes, accomplishments, and transform ations as we continue to try to create graduate and undergraduate programs that serve the needs of South Dakota, the region, and the nation.

As you may have heard, two long-time faculty members, Drs. Bill Jensen and John Grove, retired this past year. They were accomplished teachers, scholars and wonderful colleagues. They are going to be genuinely missed for all of these reasons. We have begun the search for someone to fill their positions, but it will be impossible to replace them.

The Shepard Hall departmental office staff has experienced some changes this past summer as well. Natalie Garry has assumed the position of senior secretary. Stephanie Jensen has filled the position of secretary that Natalie left when she was promoted. We welcome Stephanie to the department and congratulate Natalie on her promotion. You can find out a bit more about them both on page five.

This has become a busy year for the department. Probably the biggest challenge facing us this year is the temporary relocation of the entire Analytical Services laboratory and the faculty based in the Olson Biochemistry Laboratory (OBL) to Shepard Hall while the Animal Science Complex is renovated to modernize its ventilation systems. Renovations to Shepard Hall are currently underway as I write (November 2002) and the move is to begin in mid-December. While the tight spaces will be a challenge for everyone for the next year–the number of people working in Shepard Hall will double!–the department will receive some long-term benefits from the short-term inconveniences. We were permanently given three rooms in new Shepard Hall that had been general classrooms. These rooms will eventually be turned into labs and offices for new faculty that we'll be hiring in the next few years. Through curriculum management, the biochemistry labs are now being offered in Shepard 104 and the old biochemistry lab (SH 208) is being converted into two research laboratories for Drs. West and Sergeev. This accomplishes a number of our objectives by bringing the faculty together in one building and allowing us to better integrate the Arts and Science and Agricultural and Biological Science portions of the department. It also frees space in the OBL for Analytical Services to expand its analytical repertoire.

We hope you will enjoy this newsletter and we encourage you to use it to keep in touch with other graduates of the department. Each issue will contain information on alumni and their activities. If you would like to share something about yourself and what you're doing, please send us a note and we will include it in the next issue. We are setting up an e-mail address for departmental alumni to contact us. (More in the next issue.) You can FAX it to us at (605) 688-6364, and mail is always welcome too.

Please be in touch! On behalf of the department faculty and staff,

Utecht enhances Freshman labs with new software

Dr. Ron Utecht with Angela Carlson in a freshman lab.

Freshmen chemistry laboratory students are experiencing state-of-the-art chemical experimentation at the beginning of their academic program thanks to a technology blended curriculum developed by Professor Ron Utecht.

In the traditional undergraduate laboratory experience, students work with real chemicals and real glassware, but without the benefit of modern instrumentation for recording data or data management software.

Utecht blends the traditional lab exercise with modern instrumental methods of data collection and analysis. His approach differs from simulated laboratory exercises that are gaining popularity at some institutions. With a simulation, students simply work at a computer and click on a simulated beaker to virtually mix chemicals and then watch a pre-recorded video of the expected results. In such situations, Utecht said, students lose the tactile experience of laboratory work.

"I don't like simulations, especially for a university like SDSU," he said. "We expect our students to complete hands-on work no matter what their major is. What I've done is combine the actual laboratory experience with modern methods of data collection and analysis to provide an experience that's more suited for what our students will be doing in the real world once they graduate. Even in their freshmen chemistry experience, they are using equipment that one would expect to find in a modern chemistry lab."

One obvious advantage: students know immediately whether their results are correct without waiting for the teaching assistant to intervene.

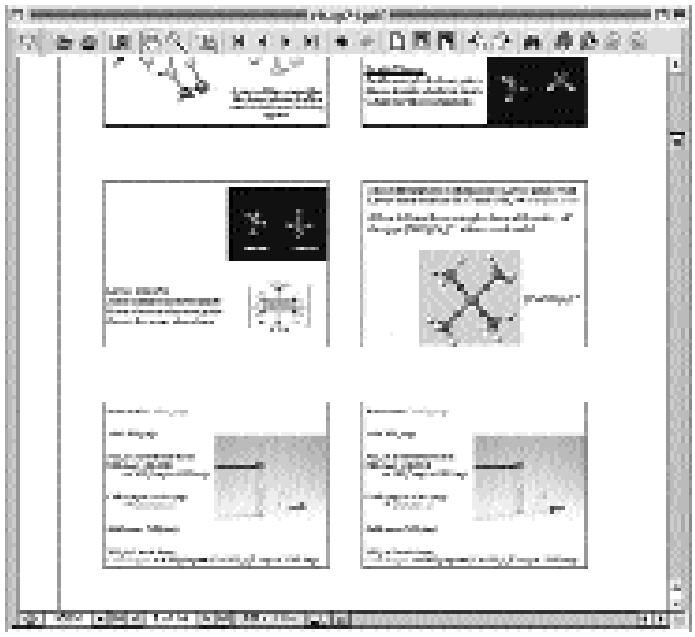
"Interactive data analysis gives students more insight and more information as it's presented," Utecht said. "One of the things we saw before implementing the technology was students would actually collect fairly good data, but they would have a tough time reducing it to a final result. In the process, they would get frustrated by not getting the right answer or even knowing if they had completed the calculations correctly."

In most experiments involving a numerical answer, there's a software function that checks students' calculations.

"If there's a mistake, the computer will let them know," he said. "It won't tell them how to do it, but it will indicate what numbers are wrong. I want to maintain the interaction between the student and the teacher assistant, because it's that mentoring interaction that helps students master chemistry. However, when there are 24 students, one teacher assistant can't go through and check everybody's math. You can with a computer and that frees the teacher assistant to help those students who are having the most trouble with the concepts."

Utecht, who has extended a version of the software package to sophomore level courses, said he would like to see the system spread to other schools.

"At this point, it's not used anywhere else. I would like to see it adopted in other places. So far, we've had some interest in it. We're working with a publisher to facilitate wider dissemination."



Example of the screens seen by students in freshman labs.

Alumni News

Noelle Umback (B.S. 1992) "After leaving SDSU I attended grad school at Colorado State (Ft. Collins) where I completed a Ph.D. in 2000. I am now employed by the Office of the Chief Medical Examiner of New York City where I perform DNA testing on evidence from crimes with biological evidence; analyze the "DNA fingerprints" obtained by those tests; prepare reports for use by the police and District Attorneys' office, and testify as an expert witness to the DNA results. Since September 11's WTC attacks, I've been working on DNA identifications of the victims, using Direct DNA matching of remains to personal items such as toothbrushes and kinship matches."

Elizabeth Erickson (B.S. May '01) is now a graduate student at the University of Kansas. She is working on her Ph.D. in Analytical Chemistry.

Thomas Offerdahl (Ph.D. May '01) "I am a postdoctoral fellow in the Department of Pharmaceutical Chemistry at the University of Kansas, where I am in charge of two Chemagnetics solid-state NMR spectorometers including operation, training and maintenance of hardware and computer systems. I have been conducting research in many aspects of pharmaceutical chemistry and have presented at several conferences and symposiums. I am scheduled to present at the American Association of Pharmaceutical Scientists meeting in Toronto in November."

Genliang Lu (Ph.D. May '02) is going to the University of Kansas to work in the Chemistry Department as a postdoctoral research associate.

Manuel Santiago (Ph.D. May '01) is teaching at the University of Tennessee-Chattanooga.

Melissa Gabbert (M.S. May '02) is teaching labs for the Chemistry Department at South Dakota State University.

Tim Grosch (Ph.D. Dec '00) is an analytical chemist for Abbot Pharmaceutical in Chicago.

Jared Anderson (B.S. May '00) is at Iowa State University working on his Ph.D.

Lora Haugaard (M.S. '00) is teaching labs for the Chemistry Department at South Dakota State University.

Each newsletter will contain information on alumni and their activities (page three of this issue). 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. We will be setting up an e-mail address for departmental alumni to contact us but in the meantime you can FAX to us at (605) 688-6364, and mail is always welcome too.

Foundation Donors

from May '01-June '02

Jan and Richard Anderson, Brookings, SD
Keith and Glynn Bartels, Mitchell, SD
Joel W. Becjmann, North Tonawanda, NY
Marla R. Behm, Bismark, ND
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State Farm Co. Foundation, Bloomington, IL
Peter and Nancy Thiex, Volga, SD
Terri and James Van Erem, Brookings, SD
Marvin L. and Anne L. Withrow, Brookings, SD

2002 Graduates and Awards

Eddie Aamold (B.S. Chem in May '02) is now a Research Associate for SDSU, working for Dr. Don Evenson at the SCSA Diagnostic Lab. He received the Sioux Valley Outstanding Senior Award and plans on attending medical school in the Fall '03.

Gina Altstadt (B.S. Chem in May '02) is deciding between working for the FBI in forensics or working for the USDA in a chemist's position.

James Childs (B.S. Chem in May '02) is looking for a job in pharmaceutical sales.

Min-Tat Ding (B.S. Chem in December '01) is hoping to attend medical school in Malaysia.

Elliot Ennis (B.S. Chem in May '02) received both the Hypercube Scholar and Sioux Valley Senior Award and is going to graduate school.

Jessica Henrichs (B.S. CLT in May '02) works in the MedTech Lab in St. Cloud.

Janel Johnson (B.S. Chem in May '02) is going to graduate school for genetics/molecular biology. She received a Sioux Valley Outstanding Senior Award

Jill Larsen (B.S. Chem in May '02) who received the Merck Index Award and Sioux Valley Outstanding Senior Award is going to medical school at the University of South Dakota.

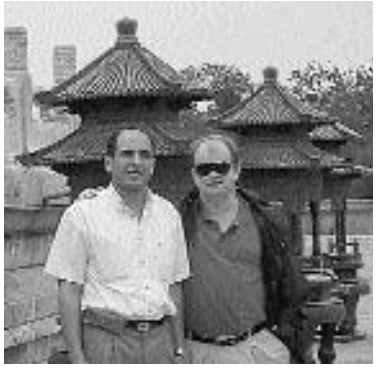
Emilee Renkly (B.S. CLT in May '02) is a medical technologist at Sioux Valley Hospital Lab.

Debra Thomas (B.S. CLT in May '02) works in the Vet Diagnostic Lab on the campus of SDSU analyzing animal blood samples.

Stephanie Paulson (B.S. Chem in May '02) is in a Ph.D. program in immunology at Iowa State and was also offered a job at Cargill.

Tonia Bensen (B.S. CLT in May '02) is looking for a job in the Twin Cities in forensics.

Chinese Seminar Results in Research Project



Fathi Halaweish, left, and Jay Shore at the Temple of Heaven in Beijing.

Collaboration with a faculty member at Yunnan Normal University in Kunming was the crowning result of a faculty development seminar in China attended by associate professors Jay Shore and Fathi Halaweish.

The seminar, which took place May 12 through June 8, included lectures and experiential education activities focusing on Chinese language, literature, history, geography, music, art and higher education. Participants developed research projects and investigations to enhance their knowledge of their subject matter as it is viewed and taught in China and contributed to the global perspective of students and faculty members.

Seminar members interacted with professors and students in their own disciplines at Yunnan Normal, with which SDSU has exchanged professors since 1987.

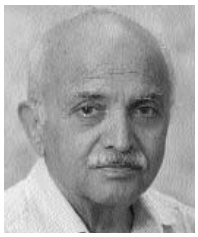
Shore gave presentations in Kunming and Hefei. His research focuses on materials using nuclear magnetic resonance spectroscopy. He has been at SDSU for eight years.

Halaweish gave several presentations in Kunming on his research on natural products/herbal medicine. He studies medicinal plants to evaluate their biological activities and toxicities. He is currently conducting projects to study anticancer, antiviral and hepatoptotective compounds from cucurbits, as well as studying toxic effects and drug interactions of herbal medicines such as Echinacea and resveratrol. Since his trip to China, faculty from Shanghai have come to SDSU to visit his lab. Halaweish has been on the SDSU faculty for six years.

The highlight of the seminar for Dr. Halaweish was the collaboration formed with Dr. Yegao Chen, professor of chemistry at Yunnan Normal University. The collaborative research project aims to find new anticancer and antiviral compounds from Yunnan medicinal plants. The research will be conducted at both universities and allow faculty from both sides to exchange ideas about herbal medicine. They also plan to initiate exchange programs for students to participate in the program, which will help them in their careers.

Faculty and Staff News


Neal Busch


O. P. Malhatra


Matt Miller


John Grove


William Jensen


Natalie Garry


Stephanie Jensen

New Faculty

Neal Busch

Assistant Professor of Chemistry (temporary)
Dr. Busch, who hails from Des Moines, IA, joined the SDSU faculty on August 15, 2002

He received a B.A. in Chemistry from Drake University in 1964; and a Ph.D. in Biochemistry from Iowa State in 1970. He completed post-doctoral research appointments at the University of Georgia in Athens, and the University of Alberta in Edmonton, Canada. His major field of research interests is proteins and protein refolding.

He has previously held positions at Mt. Marty College, Wake Forest University, and the University of Massachusetts at Amherst.

O. P. Malhatra

Assistant Professor (temporary)
Dr. Malhatra joined the SDSU faculty in August 2002, and claims Varanasi, India, and Woodbury, MN, as home.

He received a M.Sc. (Hons), Chemistry, from Panjab University, India, in 1951; a Ph.D., Chemistry, Banaras Hindu University, India, in 1957; and a Dr rer Nat, Chemistry/Biochemistry, from Freiburg University, Germany, 1959.

He and his wife have three grown children.

Matt Miller

Assistant Professor of Chemistry and Biochemistry
Dr. Miller, who grew up in Ireton, IA, joined the SDSU faculty in August 2001.

He received a B.S. in Chemistry Education, from the University of South Dakota in 1985; a M.S. in Chemistry from in 1998; and a Ph.D. in 2001, both from Purdue University.

His wife, Lisa, is an RN, and they have three children: Josh, sophomore at Purdue; Ryan, a sophomore, and Mitch, an eighth grader, in the Brookings schools.

Retirements

John Grove

Dr. Grove earned his bachelor's, master's and doctorate, all in the area of nutrition and biochemistry, from Ohio State University in Columbus.

He joined the SDSU faculty in 1968 as an assistant professor and retired in Spring 2002 as a full professor. He's enjoying retirement doing home repairs, gardening and travelling.

He and his wife, Jean, live in Brookings and have two grown children and three grandchildren.

William Jensen

Dr. Jensen earned his bachelor's degree in chemistry from the University of Minnesota in 1959, his M.S. from the University of Iowa in 1962 and his Ph.D. in Inorganic Chemistry from the University of Iowa in 1964.

He joined the SDSU faculty in 1967 as an assistant professor and retired in Spring 2002 as a full professor. Since retiring, he enjoys work as a volunteer at the Washington Pavilion, Sioux Falls Science Center.

He and his wife, Margie, have a daughter, Barbara, and two sons, Dave and Paul, and two grandchildren.

Staff

Natalie Garry

Senior Secretary
Natalie is a Brookings native and Southeast Vo Tech grad. She started as a secretary in 2001 and was promoted to Senior Secretary in May 2002. She is married to Scott and they have a son, Hunter.

Stephanie Jensen

Secretary
Stephanie, a Brookings native and Brookings High grad, joined the department as a secretary on July 8, 2002. She is married to Jamey Jensen and has a two-year-old daughter, Lexy Marie.

Antarctic Ice Holds History of Earth's Atmosphere

Working in Antarctica, dubbed "the world's best natural laboratory," assistant professor Jihong Cole-Dai heads a research team working to build a 1,400-year history of the continent's volcanic eruptions and how they relate to the earth's climate.

Funded by the National Science Foundation (NSF), Cole-Dai and chemistry graduate students Drew Budner and Dave Ferris are examining the chemical composition of old ice and snow samples taken from Antarctica.

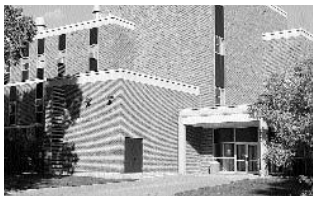
"When a volcano goes off, it puts more in the air than just ash," Cole-Dai explains. "The volcanic gases stay in the atmosphere and circle the globe for a long time. The gases turn into tiny sulfuric acid droplets that can block and prevent sunlight from reaching the earth's surface. This helps cool the climate as a whole. In Antarctica, the volcanic sulfuric acid becomes part of the snow that falls and accumulates year after year."

The snow and ice samples the team is studying are from ice cores drilled at the South Pole and stored at the National Ice Core Laboratory in Denver. Cole-Dai's team has been making trips to Denver to sample the cores for chemical analysis in SDSU's ice core and environmental chemistry lab.

Jihong Cole-Dai, right, and grad student Drew Budner, review ice core data .

"Ice cores can give you very detailed information about the atmosphere," Cole-Dai says. "The beauty of this is that by knowing how old the snow is at any depth, you get a snapshot going back in time of the chemical composition of the air. Thousands of these snapshots can give you a history of the atmosphere like a motion picture."

Initial Renovations to Shepard Hall Complete



Shepard Hall has undergone the first of three phases of renovations that will result in a modern facility that is much more conducive to both teaching and research.

Phase one, a $2 million project, included installation of new heating, air conditioning, ventilation, electrical and plumbing systems, as well as remodeling two new research labs from four smaller labs. Fume hoods in the instructional labs were also replaced. Increased research work has taxed Shepard Hall, which was originally an instructional building. More research requires more electrical capacity, and the maintenance of air quality.

The department's stock room was relocated to new space in Old Shepard. The existing stockroom is being converted to an instrument lab to house three new nuclear magnetic resonance spectrometers. The spectrometers, which Department Head Jim Rice calls "the heart of any department's instrumentation," are used extensively in instruction and even more intensively in research by faculty, post doctoral students, graduate students, and undergraduates. The existing spectrometer is now more readily available for instructional labs, like Organic Chemistry I and II and instrumental analysis.

"Phase one sets the stage so future work can be done as funds are raised," Rice says. "We all understand how important the renovation project is to the growth and strength of our undergraduate and graduate program."

Phase two involves new offices in Old Shepard and the conversion of the two-person office/lab areas in New Shepard to research modules for larger research groups. This is particularly important, Rice says, because the group is the central unit for graduate and undergraduate research because of the interaction it facilitates.

In phase three, a new wing will be built to house instructional labs and all current instructional labs will be converted to research labs. Rice says this phase will require the department to fully network the instructional labs, maximizing the opportunity for instructors to share instructional instrumentation and provide research laboratory space that can support the requirements of competitive research being done in the 21st century.

ASL staff records hectic summer

The Analytical Services Laboratory has been keeping extremely busy the past months. Professor Nancy Thiex and staff have been working hard to provide nitrate and prussic acid testing and interpretation to the drought-stricken farmers in the state.

To assist farmers with issues related to managing drought-stricken feeds, about 2,400 samples were tested from about 1,000 clients. These were in addition to the lab's regular workload, so analysts logged some long and hard hours over the summer.

The lab is also preparing to be relocated out of the Animal Science Building while the roof and the heating, ventilation and air conditioning system is being repaired or replaced. The lab will be relocated to rooms throughout both Old and New Shepard Halls during the construction, which is estimated to take 15 to 18 months. Preparations are also being made now for the eventual move back to the Animal Science Complex.

Due to all the increased activity, a new laboratory technician will be hired to serve as the sample receiving/login and sample custodian person. Interviews were being completed in mid-October.

The Analytical Services Laboratory also has a new web site at http://anserv.sdstate.edu/

Budner Attends Greek Conference

Grad student Drew Budner gave a poster presentation on ice core research while attending the American Geophysical Union Chapman Conference on Volcanism and the Earth's Atmosphere at The Thera Foundation Conference Center on the Aegean island of Santorini, Greece, June 17-21.

Budner's presentation was entitled "The Number and Magnitude of Large Explosive Volcanic Eruptions Between 1850 and 1175 A.D.: Quantitative Evidence from Two New South Pole Ice Cores." Budner works with Dr. Jihong Cole Dai on this research, which studies traces of explosive volcanic eruptions found in Antarctic snow and ice. Analyzing the chemical composition of ice cores can give detailed and quantitative records of explosive volcanic eruptions over hundreds and thousands of years.

A view of the village of Fira with the bay beyond formed by the caldera of the volcano which formed the island of Santorni.

Carlson Awarded National Scholarship

Angela Carlson is the first undergraduate student at SDSU and one of only 35 in the country to receive a Jo Anne J. Trow Scholarship from the National Council of the Alpha Lambda Delta Honor Society.

Carlson is a chemistry and biology major with plans to pursue a doctorate in biochemistry. "I'm very much interested in research that would help eliminate disease," she said. "It was exciting this summer to be involved in a research project that looked at ways to stop the growth of cancerous cells.

"Being a member of Alpha Lambda Delta has made a great impact on my education. It's a great way to meet other students and to help worthy causes. I've been fortunate to be involved in many things as an officer, working with students, administrators and community leaders coordinating events. I found this was a great opportunity to improve my speaking, writing and negotiating skills. Above all, Alpha Lambda Delta has given me more confidence to pursue endeavors that seem new and challenging."

The national council also presented the Alpha Lambda Delta chapter at SDSU a Silver Award, citing the chapter's 26-percent increase in membership during the past school year.

Recent Faculty Publications


Evenson


Halaweish


Jensen


Miller


Rice


Shore


Thiex


West

Don Evenson:

Alvarez, J.G.; Sharma, R.K.; Ollero, M.; Saleh, R.A.; Lopez, M.C.; Thomas, A.J. Jr.; Evenson, D.P.; Agrawal, A., 2002, Increased DNA damage in sperm from leukocytospermic semen samples as determined by the sperm chromatin structure assay, Fertility and Sterility, 78(2): 319-329

Evenson, D.P., 2002, Assessment of sperm using the sperm chromatin structure assay. Proceedings UCLA 15th Annual In Vitro Insemination and Embryo Transfer Course, July 14-17, UCLA, 2002.

Evenson, D.P., 2002, Role of sperm chromatin damage in abnormal reproductive outcomes. Society for Theriogeneology/ACT Annual Conference & Symposia Proceedings. Published by SFT. Colorado Springs, CO, Aug 7-11, 2002.

Evenson, D.P. and Spano, M., 2002, Flow cytometry analysis of mammalian sperm. Spermatology Chapter – Capetown, South Africa.

Evenson, D.P.; Larson, K.L.; Jost, L.A., 2002, Sperm chromatin structure assay: Its clinical use for detecting sperm DNA fragmentation in male infertility and comparisons with other techniques, Journal of Andrology, 23(1): 25-43

Perreault, S.D.; Aitken, R.J.; Baker, H.W.G.; Evenson, D.P.; Huszar, G.; Irvine, D.S.; Morris, I.D.; Morris, R.A.; Robbins, W.A.; Sakkas, D.; Spano, M.; Wyrobek, A.J., 2002, Integrating new tests of sperm genetic integrity into semen analysis: summary of break-out group discussion. Proc. of 2nd International Conference on Male-Mediated Developmental Toxicity.

Sakkas, D.; Evenson, D.P., 2002, Assessment of sperm nuclear DNA integrity, Alpha scientists in reproductive medicine, No 25

Fathi Halaweish:

Halaweish, F.T.; Kronberg, S.; Hubert, M.B.; Rice, J.A., 2002. Toxic and aversive diterpenes of Euphorbia esula. *Journal of Chemical Ecology*, 28(8): 1599-1611.

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Matthew Miller:

Francisco, J.S.; Nakhleh, M.B.; Nurrenbern, S.C.; Miller, M.L., 2002. Assessing student understanding of general chemistry with concept mapping. *Journal of Chemical Education*, 79(2): 248-257.

James Rice:

Halaweish, F.T.; Kronberg, S.; Hubert, M.B.; Rice, J.A., 2002, Toxic and adversive diterpenes of Euphorbia esula, *Journal of Chemical Ecology*, 28(8): 1599-1611

Shang, C.; Rice, J.A.; Lin, J.S., 2002, Small-angle x-ray scattering study of the quasi-crystal structure of montmorillonite-CTAB in suspension, *Soil Science Society of America Journal*, 66(4): 1225-1230

Rice, J.A., 2001, Humin, *Soil Science*, 166(11): 848-857

Shang, C.; Rice, J.A., 2001, Interpretation of small-angle scattering data from dilute montimorillonite suspensions using a modified Guinier approximation, *Physical Review E*, 64: 021401-1 to 021401-6

Shang, C.; Rice, J.A.; Lin, J., 2001, Thickness and surface characteristics of colloidal 2:1 aluminosilicated using an indirect fourier transform of small-angle x-ray scattering data, *Clays and Clay Minerals*, 49(4): 277-285

Jay Shore:

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Fitzgerald, J.J.; Prasad, S.; Huang, J.; Shore, J.S., 2000. Solid-state ^{93}Nb NMR and ^{93}Nb nutation studies of polycrystalline $Pb(Mg_{1/3}Nb_{2/3})O_3$ and (1 –x) $Pb(Mg_{1/3}Nb_{2/3})O_3/xPbTiO_3$ solid-solution relaxor ferroelectrics. *J. Am. Chem. Soc.*, 122(11): 2556-2566.

Nancy Thiex:

Thiex, N., 2002, Committee on feeds, fertilizers, and related agriculture topics, General Referee Reports: *Journal of AOAC International*, 85(1): 270-273.

Thiex, N.; Manson, H., 2002. Determination of crude protein in animal feed, forage, grain, and oilseeds by using block digestion with a copper catalyst and steam distillation into boric acid: collaborative study, *Journal of AOAC International*, 85(2): 309-316.

Thiex, N.; Manson, H., 2002, New AOAC standard for crude protein determinations in animal feed, forage, grain, and oilseed using tecator kjeltec® equipment, *in focus*, 26(2): 10-12.

Thiex, N.; Van Erem, T., 2002, Determination of water (moisture) and dry matter in animal feed, grain, and forage (plant tissue) by Karl Fischer titration: collaborative study, *Journal of AOAC International*, 85(2): 318-327.

Tom West:

West, T.P.; Strohfus, B., 2001. Polysaccharide production by a reduced pigmentation mutant of Aureobasidium pullulans NYS-1. *Letters in Applied Microbiology*, 33: 166-172.