

The Director's Letter

Another year has sped past, and brought the members of the Adams Institute recognition and progress in research and education. Our family of Associated Faculty has grown with the addition of Adjunct Professor Craig Adams from Civil, Environmental, and Architectural Engineering, Professor Wonpil Im from Molecular Biosciences, and Chris Elles, a recently hired Assistant Professor in the Division of Physical Chemistry.

Professor Craig Lunte was selected as the new Chair of the Chemistry Department this year, taking over for Joe Heppert, who has accepted the position of Associate Vice Provost for Research and Graduate Studies.

Our nine research groups continue to grow as well, and now comprise 40 graduate students, 12 undergraduate students, and 9 postdoctoral fellows. We are very proud of our researchers and of their accomplishments, detailed in the various articles in this issue of @Adams.

We are currently working on a second Buzz Adams Legacy Symposium and Reunion, planned for June 11 – 13, 2010, here on the Lawrence campus. Friends and former students of Buzz Adams, as well as friends of the Adams Institute, are invited to join us for a morning research symposium on Saturday, June 12, and a number of social events that will take place during these three days. Everyone interested is invited to attend. For more information as it becomes available, please visit the Reunion Web site at http://www.adamsinstitute.ku.edu/news/buzz_symposium.shtml.

May I wish you all the best in 2010, and thank you for your continuing support of the Adams Institute.

Sue Lunte
Director

Bob Dunn Honored as Outstanding Educator



Bob Dunn was one of five professors honored by the Mortar Board honor society as a 2009 Outstanding Educator.

Bob, who came to KU in 1995, has won several awards in recognition of his teaching and research. In 1997, he was named a national Searle scholar and received a National Science Foundation CAREER Award in recognition of his work as a teacher-scholar.

In 2000, Dunn received a national Alfred P. Sloan fellowship and was named one of the first two Self Faculty Scholars appointed at KU. His research focuses on developing new microscopic techniques to study single biological molecules.

He earned his doctorate in physical chemistry in 1992 at the University of California-San Diego and his master's degree in 1990. He received a bachelor's at California State University-Sacramento in 1988. He was a postdoctoral fellow at the Pacific Northwest Laboratory in Richland, Washington.



Adams Undergraduates Receive Seo Research Scholarships

Four undergraduate researchers from Adams research groups were awarded Seo Research Scholarships at the Chemistry Honors Banquet on May 9, 2009. The Seo Research Scholarship, made possible through generous contributions from Eddie Tatsu Seo and Alice Yoshiko Seo and Research and Graduate Studies, provides scholarships of \$1,000 to undergraduates who demonstrate dedication to exemplary scholarship and research in Analytical Chemistry.

The Seo Scholars for 2009 are Derek Jensen, a member of the Sue Lunte Research Group, Ben Kurth, Mike Johnson Group, Martin Jacques, David Weis Group, and Alan Schurle, Bob Dunn Group. The Seo Scholarships supported these four undergraduates during the summer of 2009 as they conducted the research described below.



Derek is a freshman chemistry major from Gardner, and is an Honors student at KU. Derek maintained a 4.0 unweighted GPA in high school, and completed the Kansas Scholars Curriculum at Gardner Edgerton High School. He conducted research full time during the summer of 2009 to culture macrophage cells and optimize parameters for the production of peroxynitrite by these cells.



Ben is a junior cell biology major from Olathe. He graduated from Olathe Northwest High School with a cumulative unweighted grade point average of 3.85, and has maintained a 4.0 GPA at KU. Ben is a K-INBRE Scholar and a member of the Honors Program. He plans to earn a combined MD/PhD from the University of Kansas Medical School. Ben worked on combining the 'uncaging' of the neurotransmitter glutamate with fast scan cyclic voltammetry (FSCV), a high-temporal resolution method.



Martin is a senior chemistry major who came to KU in 2006 from Fort Hays State University. He joined the Weis Research Group in August of 2008, and quickly established himself as an exemplary researcher. He expects to graduate in December of 2009. Over the summer, he tested and optimized a new custom-built refrigerated LC system and evaluated its performance for H/D exchange experiments. His work also included testing the digestion efficiency of pepsin reactor columns.



Alan is a junior in Chemistry from Manhattan. During his time at KU he has maintained a 4.0 grade point average while participating in the Honors

program, volunteering in a number of activities, and winning numerous awards. This summer he conducted research to understand the structure and dynamics of model lipid membranes. His goal was to complement single molecule measurements with high resolution NSOM measurements to provide a complementary view of membrane properties.

Congratulations to this year's winners of the Seo Research Scholarships!

IDEA and K-INBRE Scholarships Awarded to Ben Kurth and Emilie Mainz

Undergraduates affiliated with the Adams Institute continue to demonstrate leadership and excellence in research, and to win recognition for these qualities. Emilie Mainz from the Sue Lunte Group and Ben Kurth from the Mike Johnson Group have once again received funding to support their research at the Adams Institute. Emilie and Ben were among eight KU recipients of scholarships awarded by the Kansas IDEa (Institutional Development Awards) Network of Biomedical Research Excellence program.

The undergraduate scholarship program at the Lawrence campus is funded through \$25.6 million National Institute of Health grant to the Kansas IDEa Network of Biomedical Research Excellence.

The scholarships encourage students to pursue careers in science and, ultimately, promote biomedical research in Kansas. In the spring of 2009 the scholarships provided up to \$2,000.

In addition, Ben and Emilie were among eight KU students selected to receive Kansas IDEa Network of Biomedical Research Excellence (K-INBRE) spring 2009 undergraduate

scholarships. The scholarships will provide \$2,000 for the spring and (contingent of funding) \$4,000 for the summer. These funds can be used for any purpose that supports the recipient's participation in research. In addition, K-INBRE scholars may also enroll in an undergraduate research course and obtain undergraduate credit for their research.

A photo and description of Ben's research appear in the article at left.



Emilie, a Goddard sophomore majoring in Biochemistry, is currently working with graduate researcher Courtney Kuhnline on separation of dynorphin peptides using capillary electrophoresis. Emilie plans to continue her education in graduate school following graduation.

Courtney Kuhnline Receives Schering-Plough Award



Courtney Danielle Kuhnline was awarded the Schering-Plough Science and Innovation Award for 2009. Courtney is a fourth year graduate student in Dr. Susan Lunte's laboratory. She has a B.S. in investigative medical science with an emphasis in chemistry from St. Louis University. Courtney received her master's degree in pharmaceutical chemistry in January of 2008 and is a doctoral candidate in the same program.

Each year 13 students are

recognized nationally with this distinction from Schering-Plough, a pharmaceutical company in Kenilworth, New Jersey. The award is based on scientific achievement and research progress towards the student's dissertation project as well as exemplary leadership abilities and communications skills.

Courtney's research project is focused on the development of new analytical methodologies to investigate the metabolism of dynorphin, a neuropeptide, at the blood brain barrier. This peptide has been linked to numerous neurological disorders including Alzheimer's, Parkinson's disease, and neuropathic pain. In particular she will be developing an immunoaffinity microchip electrophoresis method to study dynorphin metabolism at the blood brain barrier.

Matt Hulvey Awarded American Heart Association Fellowship



Matthew Hulvey, a postdoctoral researcher in Dr. Susan Lunte's lab, recently received a postdoctoral fellowship from the American Heart Association – Midwest Affiliate. Dr. Hulvey's research project will focus on the development of a microfluidic device capable of separating and detecting peroxynitrite from single cells.

Peroxynitrite is a reactive species, formed in vivo during

proinflammatory events, that is linked to several cardiovascular and neurodegenerative diseases. As peroxynitrite is highly reactive, it exhibits a half life of less than 1 second under physiological conditions. Dr. Hulvey's primary focus will be to find a method to stabilize peroxynitrite so that it can be separated and detected using microchip electrophoresis with electrochemical detection. The single cell handling portion of the project will be carried out through collaboration between the Lunte lab and Dr. Chris Culbertson's group at Kansas State University.

Matt grew up in Troy, Illinois and graduated from Triad High School. He received his B.S. in chemistry from Missouri State University in 2003. Matt earned a M.S. in chemistry in 2005 from

Saint Louis University, and a Ph. D. from the Integrated and Applied Sciences Program at Saint Louis University in 2008. His Ph.D. dissertation was titled "Use of a Bi-Layer Microfluidic Device for Creating an Endothelium Mimic". In his spare

time, Matt enjoys playing the guitar, watching college football, golfing, and brewing beer.

Congratulations to Matt for his success in winning this prestigious postdoctoral fellowship!

Graduate Students Complete Doctoral & Master's Programs

Four graduate students in Adams research groups successfully passed their oral exams since the last newsletter, and are looking forward to walking down the hill during the next graduation ceremony.

- Phil Livanec, Bob Dunn Group, Currently Postdoc in Sue Lunte Group
Dissertation Title: "Single Molecule Probes of Lipid Membrane Structure"
- Roshan Liyanage, Carey Johnson Group, Currently Postdoc in C. Russell Middaugh Group
Dissertation Title: "Optimization and Application of Fluorescence Polarization assays and Fluorescence Resonance Energy Transfer Measurements"
- Pradyot Nandi, Sue Lunte Group, Currently Postdoc at the University of Colorado
Dissertation Title: "Development of Online Microdialysis-Microchip System for in vivo Monitoring"
- Shane Price, Carey Johnson Group, Currently Instructor, William Jewell College
Dissertation Title: "Single-Molecule Spectroscopic Tools for Measuring Microsecond to Millisecond Dynamics of Calmodulin"

In addition, three students completed Master's programs.

- Qing Chang, Heather Desaire Group, Currently Research Scientist, Pfizer, St. Louis
Thesis Title: "Glycopeptide Analysis of HIV-1 Envelope Protein using HPLC/ESI-FTICR Ms and MALDI-TOF MS with Asialofetuin Enrichment and Separation Techniques"
- Dhara Desai, Sue Lunte Group, recently moved to Newark, New Jersey
Thesis Title: "Development of an Online Microdialysis-Microchip Electrophoresis System for Near Real Time Monitoring of Amino Acids"
- Mekala Pansalawatta, Mike Johnson Group, Currently Postdoc in C. Russell Middaugh Group
Thesis Title: "Fabrication and Optimization of 25 μ m Glucose Sensor"

Congratulations to all of our graduates, and all the best in your future endeavors!

Cindy Berrie and Heather Desaire Receive Kemper Awards

Heather Desaire and Cindy Berrie were recognized for their outstanding work with students when they were selected to receive one of 20 Kemper Awards. The W.T. Kemper Fellowships for Teaching Excellence recognize outstanding teachers and advisers at KU as determined by a seven-member selection committee.



Dr. Berrie's tests are hard, and her classes challenging, but her students say she's "awesome" and would have it no other way. Berrie joined the chemistry department in 2001 and was promoted to associate professor in 2007. Many of the courses she teaches are among the most difficult undergraduates in the department face, because much of the material is new and math-intensive. Colleagues say Berrie is a polished lecturer who excels at making her classes better by updating

and rewriting class materials to make them more effective.



Dr. Desaire joined the chemistry faculty in 2002 and became an associate professor in 2007. In 2003, she developed KU's first course in mass spectrometry, an advanced class that is extremely popular. Many of her classes cover cutting-edge science and colleagues say she is skilled at keeping her teaching fresh by methodic self-evaluation.

She is also an effective communicator and lecturer who strives for student understanding. Many of Desaire's students go on to professional positions at major firms, evidence that the quality of her teaching is superb.

Congratulations to Cindy and Heather, Kemper Fellows for 2009!

George Wilson's 70th Birthday Symposium Celebrates His Career

The Department of Chemistry and the Adams Institute hosted a symposium, dinner, and reception to celebrate the career of Dr. George Wilson, Higuchi Distinguished Professor of Chemistry and Pharmaceutical Chemistry at the University of Kansas. The symposium was a sampler of recent developments in analytical chemistry, and featured ten scientists from

the U.S., France, and Japan. The all-day symposium was held in Nichols Hall on the KU campus on September 11, 2009, and was followed by a reception/dinner at the Boots Adams Alumni Center that evening. George and Bev Wilson welcomed friends and colleagues to a reception at their home on the following evening.

Dr. Wilson received his A.B. from Princeton in 1961, and his Ph.D. from the University of Illinois in 1965. Over the next 20 years, he moved from Illinois to Arizona, and then in 1987, to the University of Kansas. In addition to his distinguished professorship, George was most recently the Associate Vice Provost for Research and Graduate Studies and Vice President of the University of Kansas Center for Research, Inc.

Dr. Wilson's research areas of interest include redox biochemistry, in-vivo measurements with biosensors, analysis of chromosome structure, and



George and Bev Wilson

development of analytical reagents based on biological recognition. He has written and published over 200 research articles, and mentored more than 50 KU doctoral students.

The following guest speakers were featured at the symposium:

- Professor Diana S. Aga, PhD. Chemistry Department, University at Buffalo, The State University of New York, New York, NY.
- Binodh S. De Silva, PhD. Amgen Corporation, Thousand Oaks, CA.
- Professor Richard S. Glass,

PhD. Department of Chemistry, The University of Arizona, Tucson, AZ.

- Geetha Hewawasam, PhD. Stowers Institute of Medical Research, Kansas City, MO.
- Professor Kenji Kano, PhD. Division of Applied Life Sciences, Graduate School of Agriculture, Kyoto University, Japan, Sakyo-ku, Kyoto, Japan.
- Bruce Neri, PhD. Prometheus Laboratories, San Diego, CA.
- Dr. Gérard Reach, M.D. Service d'Endocrinologie, Diabétologie et Maladies

Métaboliques, Hôpital Avicenne and Université Paris 13, Bobigny, France.

- Professor Jean-Michel Saveant, PhD. Université Paris-Diderot, Laboratoire d'Electrochimie, Moléculaire, 15 rue Jeade Baïf, 75013 Paris, France.
- Professor Mark Schoenfish, PhD. Department of Chemistry, University of North Carolina, Chapel Hill, NC.
- Professor Christian Schöneich, Ph.D. Department of Pharmaceutical Chemistry, The University of Kansas, Lawrence, KS.



In this issue we will learn more about one of the junior faculty in the Adams Institute, Assistant Professor Michael Johnson.

Professor Johnson was born on Florida's east coast, where he spent his spare time fishing and camping. After graduating from Merritt Island High School, he attended the United States Air Force Academy, where he played intercollegiate football. After graduating from the Academy with a B.S. in Chemistry in 1988, he attended pilot training and later attained the rank of captain and senior pilot. After leaving the Air Force in 1997, he attended graduate school

at the University of Virginia and worked in the laboratory of Prof. Tim Macdonald, where he studied drug metabolism and oxidative stress. Following graduate school, he accepted a postdoctoral position in 2002 at the University of North Carolina, Chapel Hill, where he worked for Prof. R. Mark Wightman. During his time at UNC, he was awarded a postdoctoral fellowship from the Hereditary Disease Foundation to use fast-scan cyclic voltammetry to study mechanisms of dopamine release and uptake in Huntington's disease, a fatal, neurodegenerative movement disorder. In 2005, he joined the faculty at the Department of Chemistry here at KU.

Prof. Johnson's current research interests include the development and application of methods used to elucidate brain function. Current projects include the measurement of dopamine release and uptake

dynamics in Huntington's disease and fragile X syndrome, the leading genetic cause of mental retardation in children. Another project, recently funded by the NIH, is aimed at understanding the relationships between the expression of behaviors and neurochemical signaling, measured simultaneously on millisecond

timescales. Additionally, the Johnson lab is collaborating with Pinnacle Technology, Inc. of Lawrence, KS to develop a wireless fast-scan cyclic voltammetry system.

Prof. Johnson enjoys spending his spare time with his wife, Monica, and his daughter, Delaney, and walking their St. Bernard, Dorothy.

News in Brief

- The Craig Lunte Group welcomes a new member, an exchange student from the Korea University of Science & Technology in Daejeon, Korea. Nan Sook Hong will be working with the Lunte Group for six months.
- Cancer patients commonly report cognitive impairment as a result of the cancer or the cancer treatment. However, little is known about the cause or causes of this impairment, commonly called "chemo-brain". Common deficits in cognitive function include memory and concentration, focus, reading comprehension, and ability to work with numbers. A group of researchers from the KU campus and the KU Medical Center are making plans to submit a National Institutes of Health Grand Opportunity Proposal to investigate chemo-brain.

Research Highlights

Adams Faculty, Students, and Postdocs Present at Pittcon 2010

The Adams Institute and the University of Kansas will be well represented at the Pittsburgh Conference (Pittcon) in Orlando, Florida, Feb. 28 - March 10, 2010. Pittcon is the world's annual premier Conference and Exposition on laboratory science, and attracts nearly 20,000 attendees from industry, academia and government from 90 countries worldwide. The following Adams faculty, postdocs, and students will attend and make presentations:

Organized Contributed Sessions

"Enhanced Recombinant Protein Production Using a Novel, Invisible Purification Tag." Melinda L Toumi, University of Kansas, Jamie L Wenke, Jennifer S Laurence, Heather Desaire

"Development of A Microfluidic-Based Screening Device For Methylarginines In Infant Plasma." Thomas Linz, University of Kansas, Susan M Lunte

"Microanalytical Techniques for Pharmaceutically Relevant Neuropeptides." Courtney D Kuhnline, University of Kansas, Susan M Lunte

"A Microchip Electrophoresis Device for the Separation and Detection of Peroxynitrite From Macrophage Cells." Matthew K Hulvey, University of Kansas, Susan M Lunte

"Miniaturized Analytical System for Electrochemical Detection of Nitrite in Biological Matrices." Anne Regel, University of Kansas, Susan M Lunte, Pradyot Nandi

"Teaching Concepts in Analytical Chemistry at the Introductory Graduate Level." Craig E Lunte, University of Kansas

Oral Sessions

"Glycopeptidase - A Tool for Deciphering Glycopeptide Compositions." Carrie L Woodin, University of Kansas, Kathryn R Rebecchi, Melinda L Toumi, Heather Desaire

Symposia

"Emerging Strategies for Facilitating Glycoprotein Analysis." Heather Desaire, University of Kansas

"Neurochemical Applications of Microchip Electrophoresis with Electrochemical Detection." Susan M Lunte, University of Kansas, Matthew K Hulvey, Anne Regel, David F Fischer, Thomas Linz, Ryan Grigsby

"Separation Based Sensors Incorporating Microdialysis Coupled to Microchip Electrophoresis." Susan M Lunte, University of Kansas, Pradyot Nandi, Dhara Desai, Anne Regel, Ryan Grigsby

Posters

"Analytical Methods for Understanding Relationships Between Neurochemical Signaling and Behavior." Michael A Johnson, University of Kansas, Gregory Osterhaus, Andrea N Ortiz, Kelli A

Pittcon 2010 (cont.)

Lauderdale, Stephen C Fowler

"The Disulfiram Metabolite Carbamathione: A New Pharmacological Tool in Alcohol and Cocaine Addiction." Swetha Kaul, University of Kansas, Craig E Lunte, Morris D Faiman, Todd D Williams

"Engineered Glycosylation for Protein Stability: Human Growth Hormone." Jamie L Wenke, University of Kansas, Melinda L Toumi, Heather Desaire, Kathryn R Rebecchi, Jennifer S Laurence

"Using Microdialysis Sampling to Study Inhibitors of 11 β -Hsd1 as Drug Candidates." Sara Thomas, University of Kansas, Craig E Lunte

Recent Publications

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