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UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

ALUMNI NEWS

DEPARTMENTS OF CHEMICAL & BIOMOLECULAR ENGINEERING AND CHEMISTRY SPRING 2004

SCS Professor Paul Lauterbur Receives 2003 Nobel Prize

Parts of this article based on information from the UI news bureau

Our own Professor Paul Lauterbur of the Department of Chemistry was awarded the Nobel Prize in Medicine for 2003 in recognition of his discoveries concerning magnetic resonance imaging. Professor Lauterbur received the award jointly with Sir Peter Mansfield of the University of Nottingham in England (and a former research associate in the University of Illinois Department of Physics from 1962-64.)

Lauterbur and Mansfield "made seminal discoveries concerning the use of magnetic resonance to visualize different structures," according to the Nobel Committee's press release. "These discoveries have led to the development of modern magnetic resonance imaging, MRI, which represents a breakthrough in medical diagnostics and research."

Lauterbur's work continues Illinois' long tradition in NMR spectroscopy, which includes work by professors Gutowsky, Slichter, Jonas, Oldfield, and their students.

Dr. Lauterbur's key discovery centered on the introduction of gradients in the magnetic field. By analyzing the emitted radio waves, he could determine their origin and construct two-dimensional images. For example, he was able to visualize a cross-section of tubes with ordinary water surrounded by heavy



Professor Lauterbur receiving the Nobel Prize, December 8, 2003 in Stockholm.



water. The structures visible in this way could not be seen with other methods.

Mansfield further developed the use of gradients in the magnetic field, showing how the signals could be mathematically analyzed. He also showed how extremely fast imaging could be achieved. Mansfield's contributions made NMR practical for imaging, although MRI did not become important in medicine until a decade later. It is now a routine method within medical diagnostics, with more than 60 million MRI scans performed each year worldwide.

Lauterbur remains active in research and teaching; his recent interests concern the possible role of polymer imprinting in the origin of life. One of the most unusual things about Lauterbur's laboratory is that he works almost exclusively with undergraduate students. On Nobel Prize day, October 6, 2003, Lauterbur insisted that, despite non-stop media interviews and congratulations, he convene a conference with his six undergraduate students.

"It was a regularly scheduled meeting, and I was interested in what, if anything, my students had accomplished in the past week, and I also felt a certain amount of responsibility," said Lauterbur. "I don't have assistants such as graduate students, so there was no one to substi-

tute for me.

I was thinking that if I don't meet with them, then they are abandoned."

Biology major Lachlan T. Kasper, a senior from Batavia, IL, said "I feel very privileged to work with Paul. I hope that I haven't taken for granted the amount of time he spends with the undergraduates in our group. I would like to make the most of this experience."

Lauterbur joined the SCS faculty in 1985, after 22 years at the State University of New York at Stony Brook. He earned a bachelor's degree in chemistry in 1951 from the Case Institute of Technology and a doctorate in chemistry in 1962 from the University of Pittsburgh for his work on heteronuclear NMR. Over the years, seven former faculty and students from the Department of Chemistry have received Nobel Prizes, but this is the first to be awarded to a current member of the faculty.

Professor Lauterbur's Nobel acceptance speech, titled "All Science is Interdisciplinary — From Magnetic Moments to Molecules to Men," along with other information regarding his career and the prize, is available at the Nobel Committee's website at <http://www.nobel.se/medicine/laureates/2003/index.html>



From the Director's Desk

We really have too much news to fit into one issue – Professor Lauterbur's Nobel Prize, Professor Beak's election to the National Academy of Sciences, Professor Leckband's appointment to the Westwater Professorship in Chemical and Biomolecular Engineering and her election to the College of Fellows of the American Institute of Medical and Biological Engineering, and the newly funded Keck and Carver research initiatives.

Readers might wonder why we focus so much on external recognition, such as international prizes, federal grants, and gifts from alumni. We do so because external measures of quality reassure us that our instructional and research missions are excellent and visible. It is difficult for any organization to objectively assess its performance, so we place great emphasis on the opinions of others. The ability of our students to excel depends on these external measures.

Thomas B. Rauchfuss

To reach the editor...

You can reach our office by email at scsnews@scs.uiuc.edu or by fax at (217) 333-3120. Please continue to send your news and also include comments on the newsletter, alumni and development programs and any questions you may have on any of the above. Have an idea for a story? We enjoy hearing from you.

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Written by Deb Aronson

School of Chemical Sciences Faculty Receive Two Major Grants

Keck Foundation funds Neural Repair Initiative

Two SCS faculty members are spearheading a new project funded with \$1.2 million from the W.M. Keck Foundation that seeks to better understand how neurons function and how they can be repaired. Ultimately, this research underpins the development of methods to correct problems in brain circuitry, such as those underlying mental retardation, degenerative diseases, and neurochemical imbalances. Chemistry Professors Ralph Nuzzo and Jonathan Sweedler are joined in this project by Martha Gillette, Professor of Cell and Structural Biology.

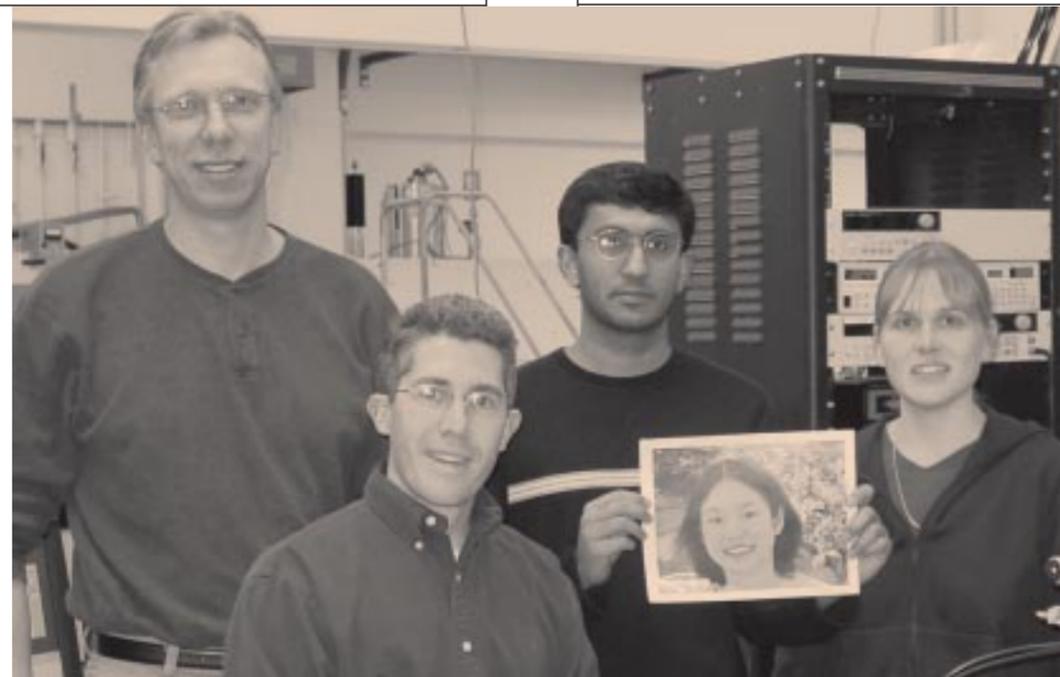
"The Keck Foundation invests in high-risk research by the best and brightest," says SCS Director Tom Rauchfuss, referring to the new grant that will support both biological and chemical studies, and initially focusing on the brains of giant mollusks, rats, and mice.

"We're trying to understand how neurons make the connections and how to repair connections in the brain," says Sweedler. "How can we encourage the brain to repair itself? Why doesn't it repair itself? What's different about a growing neuron and one that can't?"

The W.M. Keck Foundation, based in Los Angeles, is one of the nation's largest philanthropic organizations. Established in 1954 by William Myron Keck, the founder of Superior Oil Co., the foundation provides funds primarily in the areas of medical research, science, and engineering.

Carver Foundation Funds Center to Research Cellular Metabolism

A new center devoted to the study of cellular metabolism and the molecules involved in the fundamental cellular processes of living things is being



"How can we encourage the brain to repair itself? Why doesn't it repair itself? What's different about a growing neuron and one that can't?"

equipped with a \$1.1 million grant from the Roy J. Carver Charitable Trust. The center, to be housed in the Chemical and Life Sciences Building, is expected to open by Spring 2005. According to Chemistry Professor Wilfred van der Donk, the Carver grant will provide an array of instrumentation that will be virtually unique in the U.S. The instrumentation, including mass spectrometers, chromatographs, combi-chem robots, and fermentors, allow researchers to analyze small molecules — metabolites — during the life cycle of micro-organisms. By taking such chemical snapshots of what is going on inside cells, one gains insights into their vulnerabilities and strengths. In addition to van der Donk, the center is

Professors van der Donk (left) and Kelleher with graduate students Champak Chatterjee and Leah Miller. Chatterjee is holding a picture of their colleague Lili Xie who participated in a collaborative study on lantibiotic (not antibiotic) biosynthesis. This work is described in *Science* (2004), volume 303, pgs 679-681.

co-led by microbiologists Brenda Wilson and William Metcalf. Approximately 20 faculty in chemical and life science departments will use the instrumentation.

Metabolics has a wide range of potential applications: in medicine one day metabolic profiles could be used to make a quick diagnosis, something Wilson likes to call "Star Trek diagnostics," referring to the popular television program where doctors diagnose a patient's medical condition by waving a scanning device.

The Roy J. Carver Foundation is the largest private philanthropic foundation in the state of Iowa, and was created through the will of Roy J. Carver, an industrialist, philanthropist, and UIUC alumnus.

Peter Beak Elected to National Academy of Sciences



Professor Peter Beak, the Eiszner Professor of Chemistry, was elected to the National Academy of Sciences in April 2003. This is

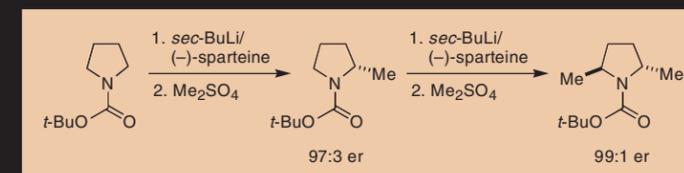
one of the highest honors accorded to a U.S. scientist or engineer. Beak has been a longstanding leader in physical and synthetic organic chemistry, making numerous influential contributions of fundamental importance.

In early gas phase and solution studies, Beak showed that the stabilities of protomeric isomers were dramatically dependent on the molecular environment,

and he devised a theory that explained these effects. This work fundamentally changed the way chemists think about these equilibria. In later work Beak developed a general method to solve long-standing questions about the geometry of reactions at non-stereogenic heteroatoms using the endocyclic restriction test. The work, which continues today, entails not only sophisticated interpretation of reaction products but also the application of demanding synthetic methodologies to generate the substrates.

Beak has long been interested in the chemistry of carbanions, organic

compounds in which one carbon center formally carries a negative charge. His research led to major new strategies for synthesizing organic compounds by means of lithiation reactions. These studies have culminated in his development of efficient enantioselective syntheses through the use of chiral amines as asymmetric modifiers and the delineation of dynamic resolution strategies. Given the importance of chirality in the pharmaceutical industry, the asymmetric metalations he has reported are both timely and practical. An example of his work is shown in the equation.



Beak obtained his B.A. from Harvard in 1957 and his Ph.D. from Iowa State University in 1961. He joined the Chemistry Department in 1961. In his research mentoring, Beak is recognized as a model professor who maintains the highest standards of scientific and ethical practice and inspires his students to realize their potential and think for themselves. He has received the Cope Scholar, Mosher, Gilman, and Gassman awards.

Through the activities of such distinguished faculty, the University of Illinois is able to provide extraordinary education to our students.



Deborah Leckband Named Head of Chemical and Biomolecular Engineering

Professor Deborah E. Leckband assumed duties as Head of the Department of Chemical and Biomolecular Engineering on August 16, 2003.

In addition, in 2003 Leckband also was recognized as the James Westwater Professor of Chemical and Biomolecular Engineering. Most recently she was named to the College of Fellows of the American Institute of Medical and Biological Engineering.

Leckband comes to the position with an exceptional record of scholarship and a significant record of cross-campus research collaborations and leadership. As a scholar, she has achieved recognition with the NSF Career award, NIH First Award, the Petit-Young Faculty Award in LAS, a Xerox Award for Research Excellence, and a University Scholar Award. Her scholarly activities have been well supported by grants from NIH and NSF.

After receiving her doctorate from Cornell University in 1988, followed by postdoctoral work at MIT and then at the University of California at Santa Barbara, Leckband began her faculty career at SUNY- Buffalo. She accepted a position at the University of Illinois, Urbana-Champaign, in 1995 and was promoted to full professor in 2002. Reflecting her scholarly breadth, she also has appointments in biochemistry, chemistry, bioengineering, and physics.

In terms of her research, Leckband

and her students seek to establish the molecular design rules underlying biological interactions in vivo and in vitro. Her students have conducted pioneering work in the quantification of molecular and surface forces that control biological adhesion. This information is critical to understanding the molecular basis of cellular interactions in, for example, cancer metastasis, wound healing, and the immune response. Her studies of biomaterials and the impact of interfacial environments on protein interactions at surfaces have wide-ranging applications, including the design of contact lens materials and tailoring biosensor performance.

In addition to her very active research program, Leckband has been a

campus leader in the University's growing presence in biomaterials and bioengineering. In her teaching role, she is best known for her course "Techniques in Biotechnology," in which students learn how the combination of biological science and chemical engineering has generated important technological advances in our society.

Professor Leckband is very enthusiastic about the future of the department, as enrollments and employment opportunities remain strong and the research portfolio of the department continues to anticipate emerging opportunities in technology and fundamental science.

Hach Scientific Foundation Establishes Undergraduate Scholarships

The School of Chemical Sciences thanks the Hach Scientific Foundation for grants that will support two scholarships per year: one for a chemistry student and one for an education student who intends to teach chemistry at the K-12 level.

The late Clifford Hach and his wife, Kathryn, who discovered useful, simplified methods for water analysis, founded the Hach Scientific Foundation in 1982 to

provide scholarships to undergraduate chemists. The focus of the Foundation is to enhance the quality and availability of science education. The foundation also supports scholarships at nine other colleges and universities.

The first recipients of the Hach Scientific Scholarships will be announced in Fall 2004.

IN MEMORIAM

Wayne Anderson, PhD '68, Chemistry (T. Brown), died July 4, 2003. He was 61. After an initial stint at the University of Delaware, Dr. Anderson worked in the chemistry department at Bloomsburg University, where in 2003 he received the 2003 Distinguished Faculty Award. Dr. Anderson's scholarship focused on chemical bonding using computer modeling.

Richard B. Hasbrouck, BS '38, Chemistry, of Lake Forest, IL, died at age 86 on April 24, 2003. A native of Peoria, he attended Bradley University before transferring to the University of Illinois to major in chemistry. After his Bachelors degree, he earned a PhD in organic chemistry at Cornell. Dr. Hasbrouck credited his basic education in organic chemistry at the U of I as the foundation of his success. For 35 years he worked as a research chemist for Abbott Laboratories where he invented the hormone commercialized as Ogen. Dr. Hasbrouck and his wife Gertrude gave generously to the School of Chemical Sciences through a Charitable Remainder Annuity Trust.

Howard V. Malmstadt, professor emeritus of chemistry, died July 7, 2003. He was 81. Professor Malmstadt, who joined the faculty in 1951, pioneered several areas of analytical chemistry focused on chemical instrumentation. He co-developed the first course in electronics for scientists



Photo of Howard Malmstadt (left) and Prof. Christie G. Enke, of Princeton, taken about 1962.

and published an influential book about the topic in 1963. After leaving Illinois, Professor Malmstadt was provost, dean, and international chancellor of the University of the Nations in Kailua-Kona, Hawaii, which he founded.

Donald Melville, PhD '39, Chemistry (H. Carter), professor emeritus of biochemistry at the medical colleges of the University of Vermont and Cornell University, died on May 15, 2003 in Burlington, VT, at the age of 89. Dr. Melville worked at Weill Cornell Medical College from 1939-1960, under fellow SCS alumnus Vincent du Vigneaud. Dr. du Vigneaud and his team were awarded the 1955 Nobel Prize in Chemistry for the isolation of the hormones oxytocin and vasopressin. Dr. Melville served as the chair of the Biochemistry Department at the University of Vermont College of Medicine from 1960 until his retirement in 1979.

David F. O'Brien, PhD '61, Chemistry (D. Applequist), died July 13, 2003. Dr. O'Brien spent the first 25 years of his career as a research scientist at Eastman Kodak in Rochester, NY. He contributed particularly to the development of cyanine dyes. In 1987 Dr. O'Brien became professor of chemistry and biochemistry at the University of Arizona, where his research focused on the chemistry and biochemistry of self-assembled nanostructures and polymerized surfactant assemblies.

Kenneth L. Olson, BS '35, Chemistry, died November 23, 2003, in Gulfport, Miss. He was 91. A retired Lieutenant Colonel, U.S. Army, he was a veteran of North African and Italian campaigns. He worked as a chemical engineer with Swift & Co.



David W. Robertson, PhD '81, Chemistry (Katzenellenbogen), died August 16, 2003. He was 48. He joined Eli Lilly Company in 1981 where his research quickly led to clinical drug

candidates. From 1991-1996 Dr. Robertson served as vice president of research at Ligand Pharmaceuticals in San Diego. From there, Dr. Robertson served the DuPont Merck Pharmaceutical Company, Pharmacia, Upjohn, and Pfizer. Dr. Robertson co-authored more than 120 scientific publications and more than 60 U.S. patents. Robertson had an international reputation both as a scientist and person. The Department of Chemistry is founding a fellowship in Medicinal Chemistry in his memory.

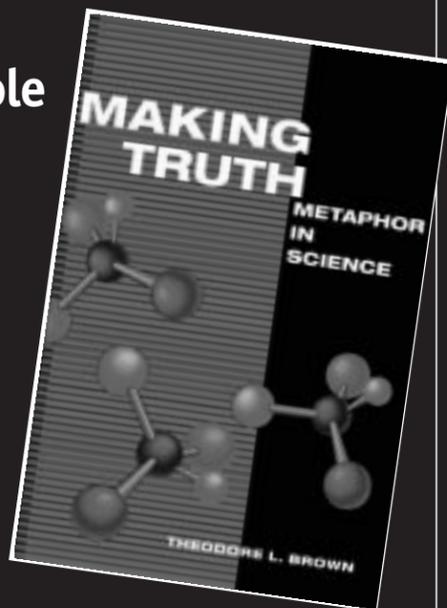
Stanley P. Rowland, PhD '43, Chemistry (Fuson), died on June 20, 2003 at the age of 87. Dr. Rowland worked initially for Rohm and Haas, where he specialized in resins and polymers. He then spent seven years with U.S. Industrial Chemicals in Cincinnati and later joined the Southern Regional Research Center at ARS as a research leader. For almost 20 years, Dr. Rowland raised beef cattle on a small farm in Tenino, Wash., with his wife, Dorothy.

Norman Edward Searle, PhD '34, Chemistry (Adams), died August 2, 2003, at the age of 93. From 1934 until he retired in 1970, Dr. Searle was a research scientist at DuPont. He published a number of papers on the organic chemistry of plants and received more than 40 patents. Dr. Searle also was a fellow of the American Association for the Advancement of Science

Ted Brown Explores the Role of Metaphor in Science

A new book by Theodore L. Brown, professor emeritus of chemistry and former director of the Beckman Institute, addresses how metaphorical thinking relates to scientific reasoning and communication. The book, titled *Making Truth: Metaphor in Science*, is published by the University of Illinois Press and can be ordered from the press or viewed online at <http://www.press.uillinois.edu/s03/brown.html>

During his tenure at the University, Brown also served as vice chancellor for research, and interim vice chancellor for academic affairs. He also is the author of *Energy and the Environment* and a coauthor of *Chemistry: The Central Science*.



■ **1994**
Joseph Yosick, BS '94, ChemE, is a patent attorney at Brinks, Hofer, Gilson & Lione in Chicago where he specializes in chemical, polymer, and nanotechnology patents. He and his wife, Colleen, recently had their first child, Conor, on July 17, 2003.

■ **1992**
Christopher L. Burcham, BS '92, ChemE, senior scientist at Eli Lilly recently joined the Commercialization Technical Center, a new division focused on process optimization.

Andrew N. French, PhD '92, Chem (Katzenellenbogen), Professor at Albion College in Michigan, has been granted a Royal Society Fellowship for his sabbatical year at Cardiff University in Wales.

■ **1987**
Tanya Griffin, BS '87, ChemE, was recently appointed manager of the Leadership Resource Planning and Executive Development at International Truck and Engine Corporation in Warrenville, IL.

Thomas J. Sowin, PhD '87, Chem (Pirkle), recently became senior project leader in cancer research area at Abbott Laboratories in Abbott Park, IL.

■ **1986**
Ken Frederick, PhD '86, ChemE (Hanratty), was promoted to engineering associate at ExxonMobil.

Jennifer Holmgren, PhD '86, Chem (J. Shapley), received the 2003 Malcolm E. Pruitt Award in recognition of her distinguished service to chemistry for "advancing the use of characterization methods and rapid experimentation techniques for developing fundamental insights into industrial catalysis."

Cathy Murphy (née Jones), BS '86, Chemistry (Rauchfuss), has been named University of South Carolina's first Outstanding Undergraduate Research Mentor. Since 1993, Murphy has had 32 undergraduate students and 10 high school students involved in her research on nanoparticle synthesis and characterization. Cathy is married to Bob Murphy (BS '89, Mathematics).

■ **1985**
Gregg Zank, PhD '85, Chem (Rauchfuss), director of New Ventures R&D at Dow Corning, was recently appointed to the Nanotechnology Technical Advisory Group (TAG) of the President's Council of Advisors on Science and Technology (PCAST).

■ **1980**
Pamela Burke Greene, BS '80, Chem, has been promoted to associate medical consultant at Eli Lilly in Indianapolis where she designs studies for clinical research trials.

Mary Kay Kaufmann, BS '80, Chem, recently was promoted to vice president of sales for North America, Industrial and Institutional Services Division for ONDEO Nalco in Naperville.

Grant Krafft, PhD '80, Chem (Katzenellenbogen), recently became chairman and chief scientific officer of Acumen Pharmaceuticals in Glenview, IL. Acumen focuses on the medicinal chemistry of Alzheimer's disease and memory loss.

■ **1977**
T. Stephen Wittrig, BS '77, ChemE, director, Advanced Energy Technologies at BP, is currently manager of grants to the Chinese Academy of Sciences and Tsing Hua University, concentrating on energy strategy and new technologies.

■ **1976**
Marshall A. Blake, BS '76, Chem (Katzenellenbogen), recently became senior vice president of The Private Bank within Bank of America in Chicago.

F. Wayne Walschot, BS '76, Chem, after 25 years at Commonwealth Edison where he was responsible for monitoring of six nuclear power plants, is tak-

ing early "retirement" by starting Financial Network Investment Co in Naperville, IL.

■ **1975**
Ruth W. Chabay, PhD '75, Chem (Smith), was elected "member-at-large, four-year college" of the American Association of Physics teachers and will serve a three-year term. She is professor of physics at North Carolina State University.

■ **1972**
Richard J. Coser, BS '72, ChemE, just moved to the Houston corporate office of Criterion Catalysts and Technologies where he serves as the general manager of their Clean Fuels program.

M. Bonner Denton, PhD '72, Chem (Malmstadt), was named the Theophilus Redwood Lecturer for 2004 by the Royal Society of Chemistry. Denton is Professor of Chemistry and Geosciences at the University of Arizona.

Terry L. Marker, BS '72, Chem, senior refinery analyst at UOP in Des Plaines, Ill., recently was awarded her 32nd patent for her R&D work in the Light Olefins & Oxygenates Tech Center.

■ **1971**
Terrence Mieling, BS '71, Chem, Director at Merrill Lynch & Co. in Chicago recently put together two bond issues for UI.

■ **1968**
Richard Larson, PhD '68, Chem (Rinehart), retired on August 31, 2003, after 24 years as professor of environmental chemistry at the University of Illinois, Department of Natural Resources and Environmental Sciences.

Lee Marek, BS '68, ChemE, received the 2003 American Chemical Society's Helen M. Free Award for Public Outreach for helping people understand how chemistry affects their lives. Marek taught high school chemistry for 28 years and has appeared many places to do chemistry demonstra-

tions, including the floor of Congress. He appeared 24 times on "The Late Show with David Letterman" to do chemistry demonstrations.

■ **1952**
Robert Wixum, PhD '52, Chem (Rose), has written a new book on the history of chromatography in the 20th century, titled *Chromatography – a Century of Discovery (1900-2000) – the Bridge to the Sciences and Technology* (Elsevier).

■ **1945**
Bruce Horrom, BS '45, Chem and **Lewis Krimen**, PhD '54, Chem (Fuson), both retired from Abbott Laboratories after illustrious careers, took a break from their busy retirement to take an expedition around Antarctica last winter.

Keep in Touch

Clip and mail to SCS News editor.

School of Chemical Sciences
University of Illinois at Urbana-Champaign
106 Noyes Laboratory
505 South Mathews Ave.
Urbana, Illinois 61801
Or
scsnews@scs.uiuc.edu

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Additional funds include support for:

Professorships: Commemorates illustrious faculty, Adams, Fuson, and Westwater, by supporting deserving successors.

Fellowships: Commemorates illustrious faculty by supporting deserving students, Bailar, Drickamer, and Marvel.

Drickamer Symposium Held

The School of Chemical Sciences held a symposium in memory of the late Professor Harry Drickamer on March 14-15, 2004. The symposium featured keynote addresses by Sir John Meurig Thomas of the Royal Institution of London, and 1999 Nobel Laureate Ahmed Zewail of the California Institute of Technology.

Read more about the symposium and Dr. Drickamer's distinguished career at www.scs.uiuc.edu/drickamer/index.html.

Schulten Animations featured on Nobel Site

In addition to their profiles of University of Illinois at Urbana-Champaign Nobel Laureates Paul Lauterbur and Anthony J. Leggett, the Nobel Foundation's official website features animations of water channels in cell membranes made by Klaus Schulten, Swanlund Professor of Physics and affiliate of the Department of Chemistry. The animations illustrate the 2003 prize in Chemistry for the discovery of these water channels.

View the animations at: www.nobel.se/chemistry/laureates/2003/animations.html

Did You Know?

Professor Neil Kelleher's group has found that about 10% of an individual's proteins are chemically different from the proteins expected when analyzing the gene sequence alone. The research resulted from a collaboration between the University's renowned supercomputer center (NCSA) and Kelleher's mass spectrometry team. The work highlights the importance of post-translational modifications, i.e. "chemical graffiti" affixed to proteins after they are produced by the ribosome. Read more about this research online at:

<http://access.ncsa.uiuc.edu/Stories/topdown>



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