Arctic sunset captured by Chemistry alumnus Mark Patsavas. Read more on page 6.
## Inside this Issue

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Letter from the Department Head</td>
<td>2</td>
</tr>
<tr>
<td>U.S. News &amp; World Report Ranks Chemistry #6</td>
<td>3</td>
</tr>
<tr>
<td>2009-2010 Faculty Awards</td>
<td>3</td>
</tr>
<tr>
<td>Commencement 2010</td>
<td>4</td>
</tr>
<tr>
<td>Dispatches From the Arctic</td>
<td>6</td>
</tr>
<tr>
<td>Ralph Cicerone Delivers Inaugural Charles David Keeling Lecture</td>
<td>8</td>
</tr>
<tr>
<td>Alumni Profile: Charles David Keeling</td>
<td>9</td>
</tr>
<tr>
<td>Gieseking Scholarship Provides Valuable Research Experience</td>
<td>11</td>
</tr>
<tr>
<td>McCall Research Group Brings Astrochemistry to Illinois</td>
<td>12</td>
</tr>
<tr>
<td>New Faces: Professor So Hirata</td>
<td>13</td>
</tr>
<tr>
<td>A Moment With Martin Gruebele</td>
<td>14</td>
</tr>
<tr>
<td>Faculty and Alumni Elected Fellows of ACS</td>
<td>16</td>
</tr>
<tr>
<td>Alumni Notes</td>
<td>18</td>
</tr>
<tr>
<td>Chemistry at Illinois’ Oldest Alumnus: Charles “Hap” Fisher</td>
<td>18</td>
</tr>
<tr>
<td>Buhreke’s Research in X-ray Fluorescence Gamers Birks Award</td>
<td>19</td>
</tr>
<tr>
<td>Remembering Richard Heckert</td>
<td>20</td>
</tr>
<tr>
<td>Remembering Stanley Smith</td>
<td>21</td>
</tr>
<tr>
<td>In Memoriam</td>
<td>22</td>
</tr>
</tbody>
</table>

## Dispatches From the Arctic

A Moment With Martin Gruebele

Faculty and Alumni Elected Fellows of ACS

Alumni Notes

Chemistry at Illinois’ Oldest Alumnus: Charles “Hap” Fisher

Buhreke’s Research in X-ray Fluorescence Gamers Birks Award

Remembering Richard Heckert

Remembering Stanley Smith

In Memoriam

## A Moment With Martin Gruebele

PAGE 14
Letter from the Department Head

As I think about this past year, the opening line of A Tale of Two Cities springs to mind: “It was the best of times, it was the worst of times…” Of course, the state of Illinois budget woes helped to make it one of the most challenging times in recent memory. Staff reductions were managed entirely in our administrative office with three of five positions remaining unfilled for a good portion of the year as hiring was frozen; two of those three were permanently eliminated. As a result, correspondence with our donors and supporters was delayed, and the patience of many of our graduate students and faculty was strained with slow responses on a broad range of services. We also worked to manage a mid-year budget recession and a cut in our teaching assistant budget.

I sincerely thank everyone who stepped up and worked extra hours under difficult circumstances to help us through this period. As always, we have some outstanding staff working in the Department of Chemistry. With their considerable extra effort and creativity, I am happy to say that for the most part we have weathered the storm. We have reorganized and retrained some of the staff, hired a Stewardship Officer, and总之, 我们可以说，尽管面临许多挑战，我们已经成功地度过了难关。

Challenges certainly remain with the state economy. And our out-of-state students continue to be courted by other universities. But good professors continue to be courted by other universities. But good institutions and programs remain attractive to top students.

Beyond educating students, research remains the central component of our enterprise, and you will read in this issue how Illinois chemists have changed our view of the Earth and the universe through pioneering research on the atmosphere, oceans, and outer space. Page 7 describes the inaugural Charles David Keeling Lecture series. Dave Keeling (B.S. 1948) made the most accurate measurements of carbon dioxide in the atmosphere, which has led to the current concern about climate change. Related work is being carried out today by Mark Par- savas (B.S. 2006, Lauderbra). As part of his Ph.D. thesis he is measuring carbon dioxide in seawater in the Arctic Ocean and has sent some beautiful photographs (see page 8). Finally, page 11 offers an overview of Professor Ben McElroy’s pioneering work in astrochemistry. I hope you find this newsletter both interesting and informative. As always, please share your ideas and stories with me (sczimmer@illinois.edu) and best wishes for the upcoming holiday season!

Sincerely yours,

Steve C. Zimmerman Head and Roger Adams Professor Department of Chemistry

U.S. News & World Report Ranks Chemistry #6

The Department of Chemistry at Illinois has risen from seventh to sixth place in the 2010 U.S. News & World Report rankings for graduate chemistry programs. The rankings represent a composite of a number of factors, including peer assessment, student selectivity, faculty and financial resources, graduation and retention rates, and alumni giving rates. The ranking reflects our dedication to excellence and achievement. Only UC Berkeley, Cal Tech, MIT, Harvard, and Stanford are ranked higher.

“As malign as such rankings are,” noted Department Head Steve Zimmerman, “departments live and die by them. Students and potential faculty pay attention to the rankings as do the administrators that set our budget.”

The rankings reflect the considerable forward momentum Chemistry at Illinois has achieved recently. In the last year alone, the department has had 16 patents listing chemistry faculty inventors, four faculty and eight alumni elected ACS fellows, and a number of other faculty and student awards. We also welcomed Professor So Hirata, a world-renowned theoretical chemist from the University of Florida. Read more about Dr. Hirata on page 12.

The rise in rankings also reflects our insistence on attracting some of the best and brightest graduate and undergraduate students. On this and the broader successes of the department, Tom Rauchfuss, former director of the School of Chemical Sciences, pointed out: “Without a doubt, one can trace back the success of our department to our very loyal alumni who have impacted our programs immeasurably.” This is a point quickly picked up by Zimmerman, who added, “These rankings are absolutely a direct result of the extraordinary partnership that we have built with our successful alumni.”

The best-known American college and university rankings have been compiled since 1983 by the magazine U.S. News & World Report and are based upon data which U.S. News collects from each educational institution either from an annual survey sent to schools or from the institutions’ websites. It is also based upon opinion surveys of university faculty and administrators who do not belong to the school.

2009-2010 Faculty Awards

Martin D. Burke will receive a 2011 Arthur C. Cope Scholar Award from the ACS. The award, which consists of $5,000, a certificate, and a $40,000 unrestricted research grant, encourages and recognizes excellence in organic chemistry. Ten Arthur C. Cope Scholars are named annually: four between the ages of 36 and 49, four age 50 or older, and two age 55 and younger. Burke will deliver an address at the 242nd ACS National Meeting in Denver in August of 2011.

Thom H. Dunning, Jr., has been awarded the 2011 ACS Award for Computers in Chemical and Pharmaceutical Research. Since 1984, this award has annually recognized outstanding individual achievement for the use of computers in education, product development, or research in the chemical and biological sciences. Given annually, it recognizes outstanding contributions to the advancement of the use of computers in the chemical and biological sciences, and consists of a cash prize and certificate. The monetary award is $5,000, plus a $1,000 travel allowance to attend the meeting at which the award will be presented.

Wilfred van der Donk will accept the 2010 Jeremy Knowles Award from the Royal Society of Chemistry for his interdisciplinary work on the discovery and development of new antibiotics, the mechanism of fatty acid oxidation by cyclooxygenase and lipoxigenases, and the development of new biocatalysts for use in the pharmaceutical industry. The award itself consists of 2,000 BP and a medal, which was presented at the award lecture on September 17 at the RSC conference “Directing Biosynthesis 2010: Discovery, Evolution, Function” in Durham, UK. As part of the award, van der Donk will also be delivering a lectureship at UK universities in March of 2011. This award is especially fitting one because Knowles served as a visiting instructor in the Department of Chemistry in 1962 before he joined the Harvard faculty. His extended time here as well as at Yale is cited as a major reason for his wanting to work in an American chemistry department.

Department of Chemistry News | Fall/Winter 2010

University of Illinois Department of Chemistry

2 | 3

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Department of Chemistry News
Fall/Winter 2010
University of Illinois Department of Chemistry

Commencement 2010: Chemistry Graduates Look to the Future

On May 16, 2010 the Department of Chemistry honored 173 graduates in the annual commencement ceremony. Family, friends, and faculty joined in the celebration, which took place at the Tyrone Festival Theater at the Krannert Center for the Performing Arts with a reception that followed on the grounds of Noyes Laboratory.

The Aduro Brass Quintet performed at the ceremony, which included remarks by Department Head Steve Zimmerman, Associate Dean of the College of Liberal Arts and Sciences Mary Macmanus Rambotam, and Commencement Speaker Dr. Elaine Fuchs.

Fuchs (B.S. 1972, Hon. 2006), the Rebecca C. Lancefield Professor in Mammalian Cell Biology and Development, and a Rockefeller University and Investigator at the Howard Hughes Medical Institute, delivered an inspirational commencement address that reflected on her own training at the Illinois in physical chemistry enabled her to ultimately study the biology of human skin. She advised students to see their education as a beginning, not an end, noting that, “Although I never took biology at the University of Illinois, I credit my education here for teaching me to pursue my passion, rather than what I was trained to do.”

In addition to recognizing each individual graduate for receiving their degree, five awards were given out to undergraduates who had distinguished themselves during their tenure at Illinois:

John C. Bailar Award for Outstanding Undergraduate Thesis
Carlos Concepcion

John David Barwin Memorial Award for Academic Achievement and personal Ethics and Scholarship
Peter C. and Gretchen Miller Markunas Scholarships
Kourtney Kay Fox

Reynold C. Fuson Awards for Academic Excellence
Megan Cisemesia and Stuart Schelkopf

C.S. Marvel Award for Excellence in Undergraduate Thesis Research
Jordan Axelson

After the ceremony, the graduates, faculty, family and guests gathered on the lawn of Noyes Laboratory for a reception. A large tent pitched on the Quad next to Noyes kept everyone dry as a light drizzle soon gave way to sunshine that suited the joyful celebration.

Bachelor of Science in Chemistry
Stevia Angesty
Jordan Cole Axelrod *&RP
Mary Patricia Choules
Megan Cisemisia †
Joseph Daniel Gomez
Ashley R. Gupta
Charlie Ho
Ada Hung
Gireen S. Karcher
Robert Y. Lee
Thomas Joseph Mazacamo
Anthony Mazzotti R&T
Eugenia Mendola
Tripta Pradeep Mohra
Lauren Moore
Jason Olynyzak
James Thomas Payne
Robyn J. Reutter
George Sang
Courtney Shaner
Phillip Taylor †
Thomas Andrew Tiojanco
Aaron White
Henny Wong

Bachelor of Science in Liberal Arts and Sciences
Favin Babz *
Sujin Bae
Christopher Beyer
Alayna C. Bradley
Gireen L. Brodnam #
Jenna Lyn Cameli
Brian Cho
Constance Hysijin Cho
Brian S. Choe
Michael John Chou*
Carlos de la Cruz Concepcion†
Delores Michælle Confer
Branne Croserell
Eric Christian Elleby
Kimberley Falta
Koushmy Ray Fox
Kimberly Ann Frick
Yasica T. Falts
Emily Ganschmietz
Matthew Ryan Gehrter†
Nathan L. Haas†

Jeanne Marie Hankett
Ryan D. Harrington
Spencer Thomas Harter
John R. Holstrom
Steven Huang
Christophe I. Jiang
Gregory M. Jenkins
Jinwook Joo
Julee Jung
Jennifer Hyunjin
Kelly Kinder
Younuk Koh
Jeanne M. Knuth
Paul C. Kornsbluh
Sarah C. Kwon*†
Britney Larsen
Huan Min Lin
Joong Hyeong Lee
Jung Wook Lee
Rebecca L. Lee
Ian Matthew Ludwig
Jacob V. Ludwig†
Adam Marek
Marius Jamie Marzalek
Olafafemi Masha
Brian Maynard
Sonja Molan
Ji Whan Moon
Melanee Nhu-Quynh Nguyen
Jenelle L. Osiee
Beth A. Papenek
Jay June Park
Kezental Monique Preston
Anjumma K. Poppalar
Feng Qur
Jared Reynolds
Emile C. Robinson
James Rogers
Abbas Sahil
Stuart Schelkopf *& RP
Leonard A. Srebryanny‡
Pujia Shangastun
Jadyn Christine Sievers
Stephanie J. Sterling
Robert E. Stewart
Kyle A. Sundell
Aleksei Christian Tan
Thomas A. Tiojanco
Paul R. Treadra†
Janelle Turner

Stevia Angesty
Jordan Cole Axelrod *&†
Mary Patricia Choules
Megan Cisemesia †
Joseph Daniel Gomez
Ashley R. Gupta
Charlie Ho
Ada Hung
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Robyn J. Reutter
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Henny Wong

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Thomas Joseph Mazacamo
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Lauren Moore
Jason Olynyzak
James Thomas Payne
Robyn J. Reutter
George Sang
Courtney Shaner
Phillip Taylor †
Thomas Andrew Tiojanco
Aaron White
Henny Wong

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Sujin Bae
Christopher Beyer
Alayna C. Bradley
Gireen L. Brodnam #
Jenna Lyn Cameli
Brian Cho
Constance Hysijin Cho
Brian S. Choe
Michael John Chou*
Carlos de la Cruz Concepcion†
Delores Michælle Confer
Branne Croserell
Eric Christian Elleby
Kimberley Falta
Koushmy Ray Fox
Kimberly Ann Frick
Yasica T. Falts
Emily Ganschmietz
Matthew Ryan Gehrter†
Nathan L. Haas†

Jeanne Marie Hankett
Ryan D. Harrington
Spencer Thomas Harter
John R. Holstrom
Steven Huang
Christophe I. Jiang
Gregory M. Jenkins
Jinwook Joo
Julee Jung
Jennifer Hyunjin
Kelly Kinder
Younuk Koh
Jeanne M. Knuth
Paul C. Kornsbluh
Sarah C. Kwon*†
Britney Larsen
Huan Min Lin
Joong Hyeong Lee
Jung Wook Lee
Rebecca L. Lee
Ian Matthew Ludwig
Jacob V. Ludwig†
Adam Marek
Marius Jamie Marzalek
Olafafemi Masha
Brian Maynard
Sonja Molan
Ji Whan Moon
Melanee Nhu-Quynh Nguyen
Jenelle L. Osiee
Beth A. Papenek
Jay June Park
Kezental Monique Preston
Anjumma K. Poppalar
Feng Qur
Jared Reynolds
Emile C. Robinson
James Rogers
Abbas Sahil
Stuart Schelkopf * & RP
Leonard A. Srebryanny‡
Pujia Shangastun
Jadyn Christine Sievers
Stephanie J. Sterling
Robert E. Stewart
Kyle A. Sundell
Aleksei Christian Tan
Thomas A. Tiojanco
Paul R. Treadra†
Janelle Turner

Emily Underwood
Ashok Venugopal
Francis A. Villar
Julie J. Weber
Valerie Jean W取胜
James Nolan Winters
Jung Hee Woor

Bachelor of Science in the Teaching of Chemistry
Gerald Joseph Brady
Michael S. Frester
Kimberly A. Fricker
Megan Livingstone
Joshua L. Mancorite
Daniel Rudnick
Mark Schuel
Patrick Sweeney

Master of Science in Chemistry
Rachel Kristina Campbell
Kyle B. Ford
Jonathan Giles
Claire H. Hieung
Brandon S. Lange
Aaron Luttos
Jared Memmert
Richard W. Pierce
David Shellhammer
Praveen Sundaradevan
Christopher David Taylor
Hayler Michelle Tomas
Heath Cameron Timmons

Doctor of Philosophy in Chemistry
Alduin M. Alkalay
Stephen Michael Anthony
Alfred Baca
Michael John Beuhren
Amita Basu
Michael Scott Bultman
Michael Boettcher
Alaadin M. Alkilany
Andrew Scott Campbell
Michael Scott Bultman
John M. Boettcher

Doctor of Philosophy in Chemical Physics
Jonathan Chen
Brian Alan Tom

*Research Table Recipients & Phi Beta Kappa
† Chancellor’s Scholar
* Double Major/Dual Degree
† James Scholar recipient
* Triple Major

University of Illinois Department of Chemistry

2010 Department of Chemistry Graduates
Mark Patsavas (B.S. 2006, Lauterbur) is currently pursuing his Ph.D. in chemical oceanography at the University of South Florida and recently returned from a month-long research trip in the Arctic Ocean. Below is an account of his time on the Coast Guard Cutter Healy performing research related to carbon systems measurements—a field pioneered by Charles David Keeling.

I am writing you from the Arctic Ocean aboard the Coast Guard Cutter Healy, the U.S. Coast Guard’s largest diesel powered icebreaker. My work here involves carbon system measurements (pH, CO₂ fugacity of the water, pCO₂ of the air, total carbon), and I am performing the world’s first in-situ high precision measurements of carbonate ion in seawater. It’s a simple method of adding lead chloride to seawater and observing the ratio of the free lead peak vs. the complexed lead carbon-seawater. It’s a simple method of adding lead chloride to seawater and observing the ratio of the free lead peak vs. the complexed lead carbon-seawater. It’s a simple method of adding lead chloride to seawater and observing the ratio of the free lead peak vs. the complexed lead carbon-seawater.

Perhaps it’s a good idea to mention more about what observing ocean acidification in the Arctic Ocean means. The world’s oceans act as a source or sink of atmospheric CO₂. Because solubility of gases increases with decreasing temperatures, polar oceans have the tendency to store more atmospheric CO₂, and act as a sink of atmospheric CO₂. The Arctic ice sheets are melting at a rapid rate, which uncovers more ocean surface area and allows for more air-sea gas exchange. Our research involves high precision spectrophotometric methods to measure parameters of the carbon system, which include: pH, CO₂ fugacity, total carbon, total alkalinity, dissolved inorganic carbon, and carbonate ion concentration in seawater. We also measured partial pressure of CO₂ in the atmosphere. This cruise is unique because it is possibly the first time that the carbonate ion concentration has been directly measured in situ. Usually, two of the parameters listed before are directly measured, and the others are calculated using thermodynamic equilibria principles of the marine carbon system. On this cruise, we were able to directly measure carbonate, and cross check our calculations of the other parameters, so we added more confidence to our data set with internal consistency.

With this information, we can compare the difference of the partial pressure of CO₂ in the atmosphere with its tendency to dissolve into the ocean (fugacity). In areas where there is no ice, the difference in pressure is smaller than areas where there is still ice cover. This makes sense because the areas of ocean without ice are approaching gas exchange equilibrium with the atmosphere. The areas of ocean covered with ice show greater potential to store more atmospheric CO₂. As the ice melts, this potential air-sea gas exchange will occur. This is good news for atmospheric carbon sequestration because the atmospheric CO₂ will dissolve into the ocean, possibly reducing the greenhouse gas effect of CO₂ but this is bad news for ocean acidification. As the atmospheric CO₂ dissolves into the ocean, a series of equilibrium reactions with water occurs and protons are released, lowering the pH of the seawater (the basis of ocean acidification). The exact implications of ocean acidification are not yet well understood, but most of life’s reactions are pH dependent, especially the formation of calcium carbonate shells or tests (the foundation of many organisms in the marine food web). The important idea to understand is that we humans are performing a very rapid acid titration in the earth’s oceans, and we don’t know when we will reach the endpoint, nor do we fully understand the possible effects of such a grand experiment.

The cruise itself was an adventure. We left out of Dutch Harbor, Alaska, where the TV show “Deadliest Catch” is filmed. Life on a ship is very different, and working in a research lab that has no windows and is constantly vibrating when the ship is breaking ice is not easy. The scenery was beautiful and ever-changing. The sun barely set every night so the coloration of the sky in the twilight was magnificent, especially against the unique ice formations. We were visited by a few polar bears, along with whales, seals, and arctic birds.

We had to ship our instrumentation and personal gear to Seward, Alaska, in April, even though the cruise started August 1st. Because of this I sent most of my old clothing in advance, so everything I am wearing on the research cruise says ILLINOIS on it, and subsequently all of the pictures taken demonstrate my true Illini spirit.
On September 13, 2010, National Academy of Sciences President, Chair of the National Research Council, and Illinois alumnus Dr. Ralph Cicerone delivered the inaugural Charles David Keeling Lecture. In his lecture, entitled “CO2, Energy, and Climate: Then and Now,” Cicerone spoke of Keeling’s life and groundbreaking research, how scientists today are adapting and expanding the subject, possible implications of the data, and the role of scientists in the global discourse on carbon dioxide emissions and climate change. The lecture, which was the brainchild of Professor Benjamin McCall, was attended by two of Keeling’s children, Eric Keeling and Emily Keeling Takahashi, and was co-sponsored by the Department of Atmospheric Sciences.

Throughout his speech Cicerone traced many facets of the global climate change conversation back to Keeling and his highly detailed data sets. “The world only needed one Dave Keeling,” joked Cicerone, who told anecdotes of Keeling’s extreme attention to detail and preparations, including measuring gas levels in parts per million, something that was cutting edge for the time and made for a highly valuable data set. It is because of his precision and accuracy, which Cicerone referred to as “really good chemistry… beyond lion, something that was cutting edge for the time and made for a climate change conversation back to Keeling and his highly detailed data sets. “The world only needed one Dave Keeling,” joked Cicerone, who told anecdotes of Keeling’s extreme attention to detail and preparations, including measuring gas levels in parts per million, something that was cutting edge for the time and made for a highly valuable data set. It is because of his precision and accuracy, which Cicerone referred to as “really good chemistry… beyond

Cicerone closed his speech by noting the implications of Keeling and his successors’ data and the role of scientists in the public discussion on climate change. Keeling saw himself as a scientist, not a politician, and actually resisted the label of “climate change” until the late 1990s when he felt that the data made it “crystal clear.” Cicerone himself expressed hesitation over scientists’ involvement in setting energy standards, saying, “I’m not sure that scientists should decide what’s dangerous… that might be for the public to decide.” However, he did stress that no matter what is gleaned from the data, smart energy decisions are necessary and that energy policy and technology must take into consideration security, costs, and climate change data.

Keeling inspired many to take up the cause of carbon cycle data collection and understand its implications in the world today. Cicerone displayed a number of graphs with data either begun or inspired by Keeling, noting that former Vice President Al Gore carried around a copy of the “Keeling Curve” and, at least for a time, it was rumored that the chart was the only scientific graph in the White House.

Cicerone’s own research has focused on atmospheric chemistry, the radiative forcing of climate change due to trace gases, and the sources of atmospheric methane, nitrous oxide and methyl halide gases. He has served as founding chair of the Department of Earth System Science at University of California, Irvine, and the president of the American Geophysical Union. For his outstanding research contributions to the understanding of Earth’s atmospheric processes, biogeochemical cycles, and other key elements of the climate system, Cicerone has won numerous awards, including the Albert Einstein World Award in Science, the Bower Award and Prize for Achievement in Science, and the Roger Revelle Medal.

In addition to the National Academy of Sciences, he is a member of the American Academy of Arts and Sciences, the American Philosophical Society, the Accademia Nazionale dei Lincei, the Russian Academy of Sciences, and the Korean Academy of Science and Technology.

The Department of Chemistry is associated with some of the greatest discoveries and scientists of the last century, but few are as globally prominent as Charles David Keeling, whose research at the Mauna Loa Observatory in Hawaii directly contributed to today’s worldwide discussion of the effect of carbon dioxide on the Earth’s environment.

A 1948 alumnus of the University of Illinois Department of Chemistry, Keeling was born in Scranton, Pennsylvania, and earned a Ph.D. in chemistry from Northwestern University in 1954. He served as a postdoctoral fellow in geochemistry at the California Institute of Technology until he was recruited by preeminent oceanographer Roger Revelle to the Scripps Institution of Oceanography in 1956, where stayed throughout his career and where his son Ralph currently serves as a professor.

It was at CalTech that Keeling developed the first instrument to measure carbon dioxide in atmospheric samples. A lifelong outdoorsman, he camped at Big Sur, where he first used his new device to measure the level of carbon dioxide and found that it had risen since the 19th century.

In 1958, Keeling started collecting carbon dioxide samples at the International Geophysical Year (IGY) base in Mauna Loa, two miles above sea level. Within two years, he had collected data to establish strong seasonal variations in CO2 levels that peaked in the late northern hemisphere each winter, with a reduction in carbon dioxide that followed during spring and early summer as plant growth increased in the land-rich northern hemisphere. In 1961, Keeling produced data showing that carbon dioxide levels were rising steadily. The plot of his data, painstakingly collected with incomparable accuracy, is now widely known as the “Keeling Curve.”

The data collection started by Keeling and continued at Mauna Loa is the longest continuous record of atmospheric carbon dioxide.
Charles David Keeling was a scientist who won many awards during his career, including the National Medal of Science—the highest U.S. award for scientific research lifetime achievement (2002), and the Tyler Prize for Environmental Achievement, considered to be the world’s most distinguished award in environmental science (2005).

In addition to his numerous awards, Keeling was a fellow of the American Academy of Arts and Sciences, the American Geophysical Union, and the American Association for the Advancement of Science, and a member of the National Academy of Sciences. He served as a member of the Commission on Global Pollution of the International Association of Meteorology, and as scientific director of the Central CO₂ Calibration Laboratory of the World Meteorological Organisation. He was also the author of nearly 100 research articles.

Keeling won many awards during his career, including the Second Half Century Award of the American Meteorological Society (1981), the Maurice Ewing Medal of the American Geophysical Union (1991), the Blue Planet Prize from the Science Council of Japan and the Asahi Foundation (1993), the Ewing Medal of the American Geophysical Union (1991), and the Blue Planet Prize from the Science Council of Japan and the Asahi Foundation (1993).

Keeling is best known for his work on atmospheric carbon dioxide. He established the Mauna Loa Observatory in Hawaii, where he began monitoring the concentration of carbon dioxide in the atmosphere in 1958. This work led to the discovery of the Keeling Curve, which shows the increase in atmospheric carbon dioxide concentration from 315 parts per million (ppm) in 1958 to 380 ppm in 2005—confirming the increase in fossil fuel emissions.

“Dave Keeling showed that atmospheric carbon dioxide amounts have grown worldwide. His measurements were done with great accuracy, from 1957 until now,” said Ralph Cicerone, President of the National Academy of Sciences and the inaugural lecturer for the Department of Chemistry’s Charles David Keeling Lecture. “The extremely high quality of his research was traceable to the amount of thought, integrity, and care that he invested in it. His results were well known, used, and respected around the world. During the early 1990s it was said that the only scientific data on display in the White House was one of his graphs; I think that story was true.”

Keeling’s work has had a significant impact on our understanding of the Earth’s climate. His research has helped to establish the connection between human activities and climate change, and his work continues to be used by scientists around the world as they strive to better understand and address the challenges posed by climate change.

Each year, gift funds allow the Department of Chemistry to provide unique learning opportunities as well as general support for students. In addition to private and industrial fellowships for graduate students, the department offers a variety of undergraduate scholarship opportunities for students.

Created seven years ago to provide aid to undergraduate chemistry majors, the Gieseking Scholarship stands as a testament to John E. Gieseking’s legacy and dedication to the University of Illinois and the Department of Chemistry. The former Illinois professor, who passed away in 2003, was a crop scientist and consulting chemist who recognized the need to support undergraduate students in pursuing their academic interests.

Research opportunities for undergrads are often transformative, leading many students to explore career paths in chemistry. Clare Kane, 2010 Gieseking recipient, said of the experience, “The scholarship is important not just because it looks good on a resume, but it provides an opportunity to explore areas of chemistry that might otherwise not be available. Doing research this past summer has taught me an enormous amount of chemistry that I would have never learned in any lecture. A hands-on approach is really key to understanding a complex subject such as chemistry.”

The Gieseking scholarship also gave students direct experience with unsupervised laboratory work, which employers and graduate schools seek. By preparing students for the public presentations and collaborative work that are standard in the field, they are far more confident and effective scientists. Gieseking recipient Arabella Lazar said of the experience, “Receiving the Gieseking scholarship was important because it gave me a chance to experience what grad school would be like. It gave me a better understanding of the research I am doing and how to articulate that to others.”

As a part of the scholarship, each student was an integral member of a research group, performing a variety of tasks and assisting graduate students. This summer’s projects included: developing grafted polymers for cell surface display, detecting RNA splicing using a biosensory tetracycline system, developing analytical applications of gold nanoparticles, and using hematoxylin and eosin staining to identify cancerous tissues.

Receiving the Gieseking scholarship allowed students to stay on campus for the summer and devote time to research and their studies, rather than returning home or taking a less career-focused job. “A scholarship is an honor,” said Alexandra Rutz, a 2010 Gieseking recipient, “but also a monetary award that allows the recipient to do the work. The scholarship is important because otherwise, a student may have to return home for the summer and take an ordinary job. The scholarship provides the means to cover the expenses of living away from home, thus facilitating an outstanding work experience.”

2010 Gieseking Scholarship Recipients and Faculty Sponsors
Emily Allen (Scott Silverman)
Caryn Donner (Catherine Murphy)
Kathryn Filson (Kenneth Sudlick)
Joel Johnson (Steven C. Zimmerman)
Clare Kane (Alexander Scherline)
Sarah Kwon (Scott Silverman)
Arabella Lazar (Paul Hergenrother)
Stephanie Lucas (Anne Banogong)
Madeline Michael (Ryan Bailey)
Alexandra Rutz (Steven C. Zimmerman)
Rebecca Weiner (Catherine Murphy)
The Milky Way galaxy contains roughly $10^{26}$ molecules; some 16 orders of magnitude more than are present on Earth. Simple diatomic molecules such as CH and CN were detected in interstellar clouds in the late 1930s, but now the known chemical inventory of these clouds includes roughly 150 species identified by high-resolution spectroscopy. Chemical models suggest there are hundreds, if not thousands, more species that must be present but have not yet been detected. There are also hundreds of molecular transitions (e.g., the Diffuse Interstellar Bands, or DIBs) that have been observed but not yet assigned to individual molecules. This rich chemical inventory is not just a curiosity—these molecules play key roles in the process of star formation, in seeding young planets such as Earth with water and other pre-biotic compounds, and as powerful indirect probes of the temperatures, densities, radiation fields, and velocities of interstellar clouds.

Understanding how these molecules are formed and destroyed in such hostile environments is truly a grand challenge for the chemical sciences. Although the young field of “astrochemistry” has made impressive progress, there is a great deal left to be understood. As illustrated in the figure below, the major areas of investigation that feed into astrochemistry can be broadly classified into four topics: molecular structure and spectroscopy; chemical reaction kinetics; chemical models suggest there are hundreds, if not thousands, more species that must be present but have not yet been detected. There are also hundreds of molecular transitions (e.g., the Diffuse Interstellar Bands, or DIBs) that have been observed but not yet assigned to individual molecules. This rich chemical inventory of these clouds includes roughly 150 species identified by high-resolution spectroscopy. Chemical models suggest there are hundreds, if not thousands, more species that must be present but have not yet been detected. There are also hundreds of molecular transitions (e.g., the Diffuse Interstellar Bands, or DIBs) that have been observed but not yet assigned to individual molecules. This rich chemical inventory is not just a curiosity—these molecules play key roles in the process of star formation, in seeding young planets such as Earth with water and other pre-biotic compounds, and as powerful indirect probes of the temperatures, densities, radiation fields, and velocities of interstellar clouds.

At Illinois, Professor Ben McCall leads a team of chemists, physicists, and astronomers with expertise in all four of these areas. In terms of molecular structure and spectroscopy, his group is building innovative laser spectrometers to acquire the high-resolution, gas-phase spectra of astrophysically important molecules (including CH, C$_2$, C$_3$, C$_4$, C$_5$, etc.) as well as the large, highly stable neutral molecule C$_60$. He also actively collaborates with theorists to perform state-of-the-art calculations of these and other molecules to guide his group’s laboratory and astronomical work. His group is also active in measuring (and, with collaborators, calculating) the rates and branching ratios of key chemical reactions, especially those involving H$_2$, the centerpiece of interstellar chemistry.

Most of McCall’s spectroscopic targets are also of great fundamental chemical interest, in that they exhibit non-classical bonding and fluxional dynamics (e.g., CH$_2$, C$_2$H$_2$) or possess very high symmetry (C$_60$). Some are also prototypical reactive intermediates in organic chemical reactions, such as electrophilic aromatic substitution (C$_6$H$_5$). The detailed understanding of the structure and intramolecular dynamics (e.g., tunneling motions) of these ions may ultimately lead to new insights into organic reactivity from a quantum mechanical perspective.

On the astronomical side, McCall is actively engaged in astronomical observations as well as analytical modeling. His group is best known for its work on interstellar H$_2$*, and using its abundance to infer the flux of interstellar cosmic rays. He is also involved in millimeter-wave searches for more complex molecules, such as urea, and in the study of the DIBs in the optical. The close synergy of laboratory, observational, and theoretical work makes his group rather unique.

McCall is also committed to educating the next generation of astrochemists. He has developed an entirely new undergraduate lecture and laboratory course. The latter has made use of the University of Illinois campus observatory. Steve Zimmermann, Head of the Department of Chemistry, fittingly noted, “Ben is a rising superstar who is pioneering this new and exciting area of chemistry. He is a gifted lecturer and a sought-after research advisor. We are delighted to have him here at Illinois.”

The Department of Chemistry is excited to welcome Professor So Hirata to the University of Illinois. Hirata received his B.S and M.S. from the University of Tokyo and his Ph.D. from the Graduate University for Advanced Studies (Institute for Molecular Science) in Japan. After completing his graduate work, he served as a visiting scholar at University of California, Berkeley, and a postdoctoral research associate at University of Florida. He was a senior research scientist from 2001 to 2004 at Pacific North West National Laboratory prior to serving as assistant professor at University of Florida, where he was promoted to associate professor in 2009. Hirata joined the Illinois faculty in August 2010 as full professor and alumni research scholar as well as a faculty member of the Institute for Advanced Computing Applications and Technologies (IACAT).

Chemistry first attracted Hirata during his undergraduate studies. “As an undergraduate student at the University of Tokyo, I was given two years to decide on a major,” said Hirata. “Of the various subjects I studied during the first two years, I was most deeply impressed by the exquisite beauty of quantum mechanics and statistical thermodynamics as applied to chemistry—namely, by how properties and transformations of molecules as individuals or as innumerable sums can be infallibly described by these mathematical theories.”

He first visited campus as a seminar speaker and was drawn to Illinois for a variety of reasons. “I liked every aspect of the University,” he said, “From its unmatched record of excellence to how the campus looked... I knew that joining the department would be the best thing that could happen to my career.”

Hirata is a computational chemist who seeks to quantitatively interpret and even predict the properties and transformations of molecules, polymers, and solids. He and his coworkers develop new mathematical methods and algorithms to make the fundamental equations of motion of chemistry, which are high-dimensional partial differential equations, tractable for numerical solutions. They make the resulting computer software available for application by the entire chemistry community. Today, they are increasingly focusing their efforts on accurate methods for understanding solids, potentially leading to new and advanced materials. The Hirata Research Group will benefit from Illinois’ commitment to cutting-edge computer technology and development. Hirata said, “Illinois offers literally the best computing resources and the brightest minds among colleagues in chemistry, physics, materials science, and computer science for this type of research.”

In searching for a leading theoretician, the Department of Chemistry consulted with the top practitioners throughout the world,” noted Steve Zimmermann. “The consensus was that So Hirata was the leading figure in his age group, an incomparable scholar whose creativity, breadth, and depth were simply outstanding. Naturally, we are delighted he chose to join our community of scholars.”

The recipient of numerous awards, including Camille Dreyfus Teacher-Scholar (2009-14), National Science Foundation CAREER Award (2009-14), Hewlett-Packard Outstanding Junior Faculty Award (2008), and the Japan Society for the Promotion of Science Fellowship for Young Scientists (1996-99), Hirata considers the Medal of the International Academy of Quantum Molecular Sciences as his most honored prize. In 2008, he won for his work on theory and algorithm developments in electron correlated methods for molecules and extended systems. The award, presented to a young member of the scientific community who has distinguished themselves by a pioneering and important contribution, was also bestowed upon Professor Nancy Makri in 1995.
Is there anyone in particular that inspires you as a chemist? My academic great-great-grandfather Linus Pauling, who I was lucky enough to still know in person, and his great-grandfather Justus von Liebig. Von Liebig was one of the first biological chemists, and the first to realize (before Kekulé’s famous synthesis of benzene) that organic and inorganic matter are fundamentally made from the same elements, and organic matter can be synthesized. At the same time, he was very practical, inventing everything from the basic laboratory condenser to the cubes of meal extract still used to flavor soups today. Pauling is perhaps the most brilliant physical chemist ever. He introduced quantum mechanics into chemistry and frankly, his general chemistry text is still better than anything around today. He worked on everything from protein secondary structure to quasi-crystals, to hybrid orbitals, to transition state theory of enzymes.

In April, you were named a fellow of the American Academy of Arts and Sciences. How does it feel to join such a prestigious group? It’s great! I hope Francis Ford Coppola shows up (also elected this year), so I can meet the creator of “Godfather,” “Apocalypse Now” and “ Patton” in the flesh and blood. It is an Academy of Arts and Sciences. How does it feel to join such a prestigious group?

In the 1970s in Austria, it was rather easy for children to buy chemicals and glassware, at least if you sounded like you knew what you were talking about. So I had a fully stocked lab at home. My parents wanted something more ‘practical’ than chemistry, but after a pre-med semester as a biochemistry major, I switched over to chemistry, synthesizing co-crystallization agents for Ken Sauer at the Melvin Calvin lab, and later doing gas phase spectroscopy on ions of interest in interstellar chemistry with rich Saykally at University of California, Berkeley.

How did you decide to pursue an education and career in chemistry? In the 1970s in Austria, it was rather easy for children to buy chemicals and glassware, at least if you sounded like you knew what you were talking about. So I had a fully stocked lab at home. My parents wanted something more ‘practical’ than chemistry, but after a pre-med semester as a biochemistry major, I switched over to chemistry, synthesizing co-crystallization agents for Ken Sauer at the Melvin Calvin lab, and later doing gas phase spectroscopy on ions of interest in interstellar chemistry with rich Saykally at University of California, Berkeley.

If you could give advice to a student interested in pursuing a career in chemistry, what would it be? If you could give advice to a student interested in pursuing a career in chemistry, what would it be? Find out where your greatest strengths are, and pursue them. Do the rest as a hobby.

Dr. Martin Gruebele, the James R. Estes Endowed Chair in Chemistry, has been with the Department of Chemistry since 1992 and over the last 18 years has garnered a number of prestigious awards for his innovative research, including a recent selection as a fellow of the American Academy of Arts and Sciences. The Gruebele Group is engaged in experiments and computational modeling to study a broad range of fundamental problems in chemical and biological physics. A common theme in these experiments is the implementation of state-of-the-art laser techniques to interrogate and manipulate complex molecular systems, coupled with quantum or classical simulations. The results of these efforts are contributing to a deeper understanding of the way that proteins fold into functional three-dimensional molecules, the details of how chemical bonds are broken by vibrational motion and how this can be controlled, and the switching of energy flow in large molecular structures on surfaces.

We caught up with Gruebele to discuss his latest research and how his family and childhood led to his career as a chemist.

Interdisciplinary interactions are easy and many on campus, and the first to realize (before Kekulé’s famous synthesis of benzene) that organic and inorganic matter are fundamentally made from the same elements, and organic matter can be synthesized. At the same time, he was very practical, inventing everything from the basic laboratory condenser to the cubes of meal extract still used to flavor soups today. Pauling is perhaps the most brilliant physical chemist ever. He introduced quantum mechanics into chemistry and frankly, his general chemistry text is still better than anything around today. He worked on everything from protein secondary structure to quasi-crystals, to hybrid orbitals, to transition state theory of enzymes.

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Your groundbreaking research on protein folding within cells has the potential to revolutionize the study of biological processes in diseases such as Alzheimer’s and Huntington’s. What drew you to this area of study? Frustration. We had been trying to study proteins in artificial crowded environments in the test tube. Although we were slowly getting results, it was very difficult because proteins would aggregate under these conditions (speaking of Alzheimer’s and Huntington’s, which are aggregation-related diseases). At one point I thought, “It can’t be any harder to just do this in a real cell” and over the last 10 years we have seen an even further extension of this to interdisciplinary collaboration creating very large effective group sizes. Interdisciplinary interactions are easy and many on campus, and I’ve co-authored papers with many other faculty. The interdisciplinary system has its pitfalls (committee-lim), but also, as “Big Physics” discovered over 70 years ago, its advantages.

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If you could give advice to a student interested in pursuing a career in chemistry, what would it be? Find out where your greatest strengths are, and pursue them. Do the rest as a hobby.

Is there anything else you would like to add? I’ve been here for well over a decade. I look forward to the next!
Four professors and eight alumni of the Department of Chemistry were among the 192 distinguished scientists elected 2010 Fellows of the American Chemical Society (ACS) at the Fall National Meeting in Boston. Unlike other ACS national awards, this honor is bestowed upon scientists who have made outstanding contributions to both chemistry and the ACS. The group includes scientists from a wide range of disciplines and geographic locations, including 33 technical divisions and 79 local sections. The 2010 class also includes distinguished scientists and engineers from industry, academia, and government.

Professor Peter Batz, the James E. Riker Emlerius Chair in Chemistry— a leader in physical organic chemistry— has advanced the characterization and understanding of organic reactions. He has made significant contributions to stereochemistry through his study of reaction geometry at nonstereogenic atoms. He also is a member of the National Academy of Sciences and a fellow of the American Academy of Arts and Sciences.

Professor Theodore Brown, an emeritus professor of chemistry, was the founding director of the Beckman Institute for Advanced Science and Technology. He has been an active leader and adviser within the scientific community, including service on the ACS Governing Board for publishing and co-chairing a National Academy committee on interdisciplinary research. He is a pioneer in the area of organometallic chemistry. He has written books, chapters and patents and made about 270 presentations. He is the recipient of numerous professional awards and serves as the editor of Theoretical Chemistry Accounts and as the North American editor for the Journal of Physical Organic Chemistry.

George Ingold (B.S. 1949), who worked as an undergraduate for Professor G. Frederick Smith, has traveled to and lectured in about 60 countries in his career. He has published more than 300 articles, books, chapters and patents and made about 270 presentations. He has worked in private industry as well as the public sector, including 40 years at the USDA-ARS National Center for Agricultural Utilization Research, where he created TRIM TECHNOLOGIES. Ingold has been recognized many times for his expertise in the field of food science, including the prestigious Linus Award, the highest award for achievement by the state of Illinois, in 2005. Said Ingold, “I have contributed to many scientific discoveries and seen most of the world since my undergraduate years, but those Illinois days will never be forgotten.”

Leonard Interante (Ph.D. 1964, Ballaert) is currently professor of chemistry and chemical biology at the Rensselaer Polytechnic Institute. Interante was an NSF Postdoctoral Fellow in London at University College. His first teaching assignment came as an assistant professor at the University of California, Berkeley, where he continued for four years. Before coming to Rensselaer in 1985, Interante spent 17 years at the General Electric Research and Development Center in Schenectady. He is the founding and current editor-in-chief of the ACS journal Chemical of Materials.

Paul Jones (Ph.D. 1956, Fusion) is currently a visiting scholar at the University of Michigan and professor emeritus of chemistry at the University of Notre Dame, where he has been a faculty member since completing his Ph.D. in 1956. In addition to his academic positions, Jones has been the recipient of numerous research and faculty fellow positions, including two Fulbright fellowships. He is active in the American Chemical Society, serving as ACS Councilor, Houston Valley Section from 2003-2009 and as a member of the ACS Publications Committee from 2006-2010.

C. Gordon McCarty (Ph.D. 1963, Curtin) is currently adjunct professor at University of South Carolina Beaufort. He had previously worked for Bayer Corporation in Pittsburgh. In addition to his industrial and academic careers, McCarty has been dedicated to the ACS, serving on its board of directors.

Tim Minton (B.S. 1980) traces his scientific career back to his year working with Professor Willis Flygare. After receiving his Ph.D. from the University of California, Berkeley, Minton returned to Illinois to do post-doctoral research with Doug MacDonald. After five years at the Jet Propulsion Laboratory, Minton left to pursue an academic career in the Chemistry and Biochemistry Department at Montana State University, where he has worked for 15 years. His research focuses on reaction dynamics, with special emphasis on hyperthermal gas-phase and gas-surface reactions and their relevance to environmental effects on space vehicles in low Earth orbit.

Christopher Welch (B.S. 1982, Ph.D. 1989, Pickle) is a Distinguished Senior Investigator at Merck Research Laboratories, where he has been employed for 11 years. He worked with Professor Pickle during his undergraduate and graduate tenure at Illinois and noted that his undergraduate research experience solidified his decision to become a working chemist. Since receiving his Ph.D., he published more than 175 articles and is now viewed as an expert in the field of chiral chromatography. Welch said, “At Illinois we were always reminded that in addition to pursuing personal research objectives, it was also important to support the infrastructure of chemistry. I have tried to follow that guidance, and have been an active member of the ACS, where I currently serve as a Councilor for the Division of Organic Chemistry (ORGN). I’m thrilled to be one of the nine U of I graduates inducted in the 2010 class of ACS fellows.”

Inaugurated in 2009, the fellows program recognizes a select group among the 161,000 ACS members who have made exceptional achievements in both science and society. The ACS is the world’s largest professional society and we are delighted that so many Illinois alumni have been selected as fellows.
Alumni Notes

Tony Barnes (Ph.D. 1984, Niemann) is currently Senior Vice President of Clinical Diagnostics of Rules Based Medicine in Austin, Texas, as well as a Special Professor of the University of Nottingham and a fellow at the Institute for Advancing Medical Innovation at Kansas University. Previous to his position at Rules Based Medicine, Barnes started a company with Professor John Robertson of Nottingham University with the goal of using the early detection of autoantibodies to cancer specific antigens to save cancer patients. The company raised more than $45 million in support and developed a product which has recently been shown to detect lung cancer early and with good reproducibility.

Theodore W. Gray (B.S. 1986) one of the founders of Wolfram Research and currently Wolfram’s Director of User Interface Technology, has received the James T. Grady–James H. Stack Award for Interpreting Chemistry for the Public sponsored by the American Chemical Society. The purpose of the award is to recognize, encourage, and stimulate outstanding reporting directly to the public, increasing the public’s knowledge and understanding of chemistry, chemical engineering, and related fields.

Philip Horwitz (M.S. 1955, Ph.D. 1957, Minkoff) a Senior Scientist at northStar engineering (m.S. 1957, ph.D. 1959) was also the holder of countless technology patents on the subject of chemical separations and the winner of numerous awards, including the American Chemical Society's Actinoide Separations Award, the 2000 American Chemical Society Award in Separation Science and Technology, and in 2004, the prestigious Becquerel Medal Award presented by the Royal Society of Chemistry in London.

Steven Thorn (M.S. 2000) is the founder of Thorn & Associates LLC. His practice covers all aspects of federal and state environmental law. Prior to founding the firm, Thorn was an Associate Regional Counsel of U.S. EPA, Region 5 (handling matters in Illinois, Indiana, Ohio, Minnesota, Wisconsin and Michigan) and an environmental attorney at a large Chicago-based law firm. During this time, he was involved in several hundred enforcement matters that spanned the spectrum of environmental statutes. In addition to winning numerous awards for his work, he was designated a Leadership in Energy and Environmental Design Accredited Professional (LEED® AP) by the United States Green Building Council.

To submit an alumni update and receive the most current and news, check out the alumni page on the Department of Chemistry website: chemistry.illinois.edu/alumni

Chemistry at Illinois’ Oldest Alumnus: Charles “Hap” Fisher

The Department of Chemistry is delighted to send birthday wishes to Charles “Hap” Fisher, our oldest known living alumnus, who celebrated his 104th birthday on November 20, 2010.

Fisher was Professor R.C. Faison’s first U.S. graduate student, receiving his M.S. and Ph.D. in 1929 and 1932. After completing his doctoral work during the Great Depression, he received a three-year teaching appointment at Harvard University. Fisher has said his goal in life was to “make people’s lives better through science,” and he had a successful and prolific career after leaving Harvard to work for the U.S. government in several research capacities, with the bulk of his time spent at the Southern Regional Research Center (SRRC) in New Orleans, Louisiana. During his tenure at SRRC, Fisher appeared as inventor or co-inventor on 72 patents, including popular products such as flame resistant cotton, frozen orange juice, wash-and-wear and durable press cottons. In addition to the numerous products he worked on, he also authored more than 200 scientific articles.

He later returned to academia after his retirement from government work, teaching chemistry at Roanoke College, his undergraduate alma mater. Despite his retirement, Fisher actively taught and was instrumental in growing the chemistry department, suggesting programs such as guest speaker seminars and student research initiatives. It wasn’t until his 100th birthday that he retired, again. Today, the Organic Chemistry Lab at Roanoke College bears his name to recognize his efforts and contributions.

Fisher and his work have garnered numerous awards and recognition throughout his career, including the Presidential Citation of Merit from the American Institute of Chemists and being named a “Chemical Pioneer,” a program that he was instrumental in initiating.

Happy 104th, Hap!

Buhurke’s Research in X-ray Florescence Garners Birks Award

The Department of Chemistry is delighted to announce that Dr. Victor Buhrke (B.S. 1950, M.S. 1952, Ph.D. 1954) has received the prestigious Birks Award for his work in X-ray fluorescence (XRF). The award was presented in August at the Denver X-ray Conference, a meeting that attracts approximately 500 scientists from around the world. The award was established in 1986 to recognize outstanding contributions to the field of X-ray spectrometry, and was named in honor of L.S. (Verne) Birks for his many contributions to the X-ray analysis field.

The Birks Award is Burhke’s second award from the Denver X-ray Conference. In 2005, he received the Jenkins Award for lifetime achievement in the advancement of the use of X-rays for materials analysis.

Receiving both awards is an extraordinary accomplishment, an honor shared only by Buhrke and his friend Dr. John Gilfrich. These awards stand as a testament to Buhrke’s five-decade-long career and his outstanding contributions to the field, including writing the seminal text on specimen preparation, which has enabled scientists worldwide to increase the accuracy of their XRF and X-ray diffraction (XRD) analysis.

About the honor, Buhrke said, “Receiving the Birks Award is a very exciting event in my life. Birks and Jenkins are both deceased. They were very dear friends of mine and I hope they are both looking down to see me smiling.”

Throughout his career, Buhrke has remained involved in the activities of Illinois and the Department of Chemistry. In 2007, a generous bequest from Buhrke and his wife Janet led to the renovation and dedication of 108 Noyes as “G.L. Clark Hall,” named in honor of their friend and mentor Professor G.L. Clark, an expert and innovator in X-ray applications, and who mentored Gene Bertin, another recipient of the Birks Award and friend of Buhrke and the Department.
Richard E. Heckert, Illinois alumnus, supporter, and former CEO of DuPont, passed away January 3, 2010, at his home in Pennsylvania at the age of 85. He will be remembered for his kindness, generosity, and dedication to Illinois chemistry, its students, and its mission.

Heckert was born on January 13, 1924, in Oxford, Ohio. He graduated in 1944 from Miami University in Oxford with a B.A. in chemistry. From 1944 to 1946, he served in the United States Army, working on the top-secret Manhattan Project at the Oak Ridge, TN, atomic energy facility. Following his discharge, he received an M.A. (1947) and a Ph.D. (1949) in organic chemistry from Illinois under Harold Snyder.

Beginning in 1949, Heckert spent his entire career at the DuPont Company, holding a number of positions and eventually rising to CEO in 1986. Described by Fortune magazine as “gregarious, refined and unforgettable...a 6-foot-5, friendly bear of a boss,” Heckert was committed to research and safety. He lobbied extensively for fair treatment of the chemical industry in Washington, DC, while working hard to ensure that DuPont plants and products were safe for employees and their environs. He engineered the withdrawal of DuPont from the Savannah River Plant, a nuclear facility DuPont managed for the government. When it was determined that chlorofluorocarbons were detrimental to the ozone layer, he acted quickly to phase out CFCs by the end of the century.

In addition to his work at DuPont, Heckert was also an advisory director of Marsh & McLennan Companies, Inc., as well as a director of Remington Arms Company, Inc. and RACI Holding, Inc. He was chairman of the board of the International Tennis Hall of Fame and a director of the Pennsylvania Oil Company. He was chairman of the board of Marsh & McLennan Companies, Inc., as well as a director of Remington Arms Company, Inc. and RACI Holding, Inc.

Throughout his career, Heckert remained dedicated to the University of Illinois and Department of Chemistry, receiving an Alumni Achievement Award in 2004. His commitment to excellence at Illinois and his generosity allowed for the creation of both the Snyder Graduate Fellowship, named in honor of his mentor at Illinois, and the Richard E. Heckert Endowed Chair in Chemistry, currently held by Professor Wilfred A. van der Donk.

“It is a truly great honor to occupy the Heckert chair,” said van der Donk. “Although I only had the pleasure to get to know him during a period of about two years, I always tremendously enjoyed my conversations with Dick. He had very diverse interests and such an open and inquisitive mind. It was fun to talk about his days at Illinois and how much things had changed. But at the same time, his recollections illustrated how in many ways Illinois chemistry has remained the same: a highly interactive and collegial environment. And obviously, he had fantastic stories from his illustrious career. I was particularly pleased and honored that Dick was here for the investiture of the chair and that my students got to meet him and hear him speak about chemistry at Illinois and about his career.”

Always modest and unpretentious, at first Heckert did not wish to have the Chair named after him, but instead merely wished to provide the funding to allow a Chair in chemistry to be created. Only at the request of the department and the University of Illinois Foundation would Heckert agree to allow the Richard E. Heckert Chair to be named as it was. Now, it provides prestige and support to its holders and stands as a tribute to one of chemistry’s distinguished alumni.

Richard is survived by his wife, Joanna, and two children from his first marriage, Alex Y. Heckert and Andra Heckert Rudershausen. An avid outdoorsman, Heckert served the environment by chairing The Nature Conservancy from 1989 to 1995. He enjoyed fly-fishing, ocean fishing, hunting, as well as shooting trap and skeet. A six-handicap golfer in his prime, he had memberships at Pine Valley and Augusta National golf clubs. Heckert also served as president of the Bear River Club near Brigham City, Utah, from 2001-2009. He was an avid vegetable gardener, growing a truck-size garden at his home in Pennsylvania, and also enjoyed the challenge of managing the shorter growing season in his Wyoming garden.

“What an extraordinary person and amazing life,” noted Steve Zimmern. “Dick will be greatly missed here at Illinois. His humility in attributing his success to Illinois and particularly Harold Snyder was inspirational. I will always remember how when we walked through Roger Adams Laboratory he would greet each student we passed with a commanding, yet gracious, ‘Hello, how is it going? He clearly felt a part of our family and we are fortunate to be able to count him as one of Illinois’ greats.”

Stanley G. Smith, beloved professor, innovator, and friend of the Department of Chemistry, passed away on June 1, 2010, following a three-year battle with cancer.

Smith joined the faculty at Illinois in 1960 after receiving his B.S. from the University of California, Berkeley and his M.S. and Ph.D. from UCLA. Within three years he had published three single-authored papers including his first on what would become a seminal study on the mechanism of Grignard, organolithium, and lithium aluminum hydride addition to carbonyl compounds. This was made possible by his development of a scanning, infrared, stopped-flow spectrometer. He and his group subsequently carried out some of the earliest mechanistic studies on the addition of copper reagents to unsaturated ketones.

Smith was widely regarded as one of the brightest young practitioners in the area of physical organic chemistry, and his studies included mechanistic work on solvolyses, allylation, photochemical, rearrangement, and elimination reactions. In 1968 Smith began researching the use of computers in chemical education, and in 1970 published in the Journal of Chemical Education a groundbreaking paper entitled, “Use of Computers in the Teaching of Organic Chemistry.” This began a 40-year period where his leadership led to the widespread integration of computer-based technologies into instruction in general and organic chemistry. Milestones during that period included extending the PLATO-based instructional programs to microcomputers in 1979, incorporating videodisc technology in 1984, which enabled the integration of videos into learning programs, and preparing a first of the instructional CDs.

Smith applied his research on computer-based chemical education in the creation of the Chemistry Learning Center in 1972 as a way to teach basic chemistry concepts through drill-based tutorials. Cutting-edge in technology and philosophy, Smith’s vision was to allow students to work through tutorials at their own pace and order of choosing. In addition, he created a suite of tutorials in a broad range of topics in chemistry. He was widely acknowledged as a leader in computer-assisted learning in chemistry, with his programs widely adopted by universities, colleges, and secondary schools.

Today, the Chemistry Learning Center continues Smith’s vision of providing technology and a high level of support to chemistry students. Open six days a week and evenings to accommodate students’ busy schedules, the CLC provides a variety of tutoring options, 70 computer workstations, and study space. Smith had said of the space, “The barriers to learning become lower. With the software it’s easier now to imagine chemical structures, you can balance equations visually, not rely solely on your imagination. Learning chemistry becomes conceptually easier.”

Over the years, he was widely recognized for his work with numerous awards, including the EDUCOM/ENCRIPTAL Best Tutorial Software Award and Best Chemistry Software Award (1987), the Chemical Manufacturing Association Catalog Award (1987), the Best Integrated and Best Chemistry Software in 1989, the IBM/EDUCOM Robin- son Award for Instructional Computing in 1992, and the George C. Pimentel Award from the American Chemical Society in 1998. He was a fellow of the Association for the Development of Computer-Based Instruction and the Sloan Foundation. In 1990 Smith was appointed jubilee professor in the College of Liberal Arts and Sciences and in 1995 was appointed as the first Murdock-Mallory Chair in Chemistry, a title he held for more than a decade.

In addition to his innovation in computer-assisted learning and his prestigious research career, Smith will be remembered as a great colleague, advisor and friend. “Stan was an unfailing source of support and encouragement,” said Bob McMahon (B.S. 1988). “I relied upon his wise counsel and dispassionate advice throughout my professional career.” Professor Peter Brak noted that Smith was instrumental in starting the service facilities, now a vital resource provided by the School of Chemi- cal Sciences. He wrote, “Stan was a truly remarkable colleague. Much of my early work was forged by discussions with him. In that, as well as in my later research, he was always willing to go out of his way to pro- vide ideas, analysis, and helpful criticism.”

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In Memoriam

William Bonick, Jr. (Ph.D. 1957) passed away November 11, 2009. He was born in Dunmore, PA, and received his undergraduate degree from Kings college, before receiving his Ph.D. from the University of Illinois. He worked for American Cyanamid for 40 years before retiring in 1997, and was a member of the American Chemical Society. Bonick is survived by his wife of 53 years, Barbara, two daughters, a son, and siblings, as well as many grandchildren, nieces, and nephews.

Homer J. Birch (M.S. 1949, Ph.D. 1952) passed away June 1, 2018, passed away April 18, 2010. While working as a chemist and supervisor during World War II, Birch completed his M.S. and Ph.D. at Illinois while working as a teaching assistant and a research chemist doing instrumental work for other students. He also assisted in the early development of carbonless copy paper for National Cash Register. He returned to the Belle Works of DuPont where he performed advanced analyses in polymer development and catalyst research. Birch has been a resident of the township of Marshall since 1957. He came to Pennsylvania in 1956 to work at Callery Chemical Company, a division of ICN Chemicals. He then moved to Evans City as a chemical laboratory supervisor in the development of high-energy fuels for the U.S. Department of the Navy. In 1969, he worked at the Applied Research Laboratory of U.S. Steel as an associate research consultant, where he performed analytical work in the development of plated steels, powder steels, and various polymers. Birch is survived by his wife of 68 years, Edith Malisek, and their children: Norman James Birch (Alaine), and Emily Kristine Birch (Barbara James), his brother Paul Birch of Shurth, OH, and numerous cousins, nieces, and nephews. He was preceded in death by his brother Clifford and his sister Mary Louise.

Fred Easterday Boettner (Ph.D. 1947) passed away February 3, 2010. Born in Murphysboro, IL, Boettner received his undergraduate degree from Carthage College and his Ph.D. degree from the University of Illinois before attending the University of Illinois. His career spanned five decades, and he was well known in the chemical field, accumulating more than 25 U.S. patents and 228 foreign patents. His work with the National Cancer Institute was especially acclaimed due to his participation in the development of Taxol, an anti-cancer drug. Boettner was a member of the American Chemical Society for more than 50 years, and he is survived by three children, his grandchildren, and a great granddaughter.

Paul L. Cook (M.S. 1952, Ph.D. 1954) passed away February 2, 2010. He was born March 2, 1925, in Holland, MI, to Peter and Adelina (Bean) Cook. He graduated from Holland Christian High School in 1943, then served his country in the U.S. Army during World War II in the 102nd Infantry from June 14, 1943-September 1948, stationed in France, Belgium, Holland, and Germany. Cook received the Bronze Star for bravery. He graduated from Hope College in 1949 and received a master's degree and Ph.D. degree in organic chemistry from the University of Illinois. After graduate school, he began his teaching career at Albion College. He taught chemistry for 36 years, served on many faculty committees, and passed on his love for chemistry and education to students who went on to graduate school or medical school. He was a member of the American Chemical Society, Sigma Xi, The University of Illinois Alumni Association, Albion Exchange Club, and the Lansing American Legion. In addition to his wife, Alice, of 58 years, he is survived by four daughters, ten grandchildren, and one brother. He was preceded in death by his parents, a sister, and brother-in-law.

Philip Nickeron James (Ph.D. 1957) passed away August 15, 1992, died peacefully of natural causes, in Sun City, AZ, on June 28, 2010. James was a graduate of Millikin University and held a Ph.D. in organic chemistry from the University of Illinois. He married the love of his life, Barbara Fagan James, in 1954. After working as an executive leader in academia, industry, and government for more than 40 years, James and his wife retired and toured America in their motor home. He is survived by his sons, Siegfried and Larry, and his grandchildren, Chris and Jill.

Homer J. Birch (M.S. 1949, Ph.D. 1952) passed away July 5, 2010. Homer was born in the 102nd Infantry from June 14, 1943-September 1948, stationed in France, Belgium, Holland, and Germany. Cook received the Bronze Star for bravery. He graduated from Hope College in 1949 and received a master's degree and Ph.D. degree in organic chemistry from the University of Illinois. After graduate school, he began his teaching career at Albion College. He taught chemistry for 36 years, served on many faculty committees, and passed on his love for chemistry and education to students who went on to graduate school or medical school. He was a member of the American Chemical Society, Sigma Xi, The University of Illinois Alumni Association, Albion Exchange Club, and the Lansing American Legion. In addition to his wife, Alice, of 58 years, he is survived by four daughters, ten grandchildren, and one brother. He was preceded in death by his parents, a sister, and brother-in-law.

Edwin G. Krebs (B.S. 1940, Hon. 1995) born in Lansing, IA, on June 6, 1918, passed away at home December 21, 2009, in Seattle. Krebs was a member of the National Academy of Sciences and received a number of major prizes, most notably a shared 1992 Nobel Prize for discovering a crucial bodily process that helps govern the movement of muscles, the shape and division of cells, and even learning and memory. The process he discovered in the 1950s with Edmond H. Fischer was the recipient of the Third Nobel Prize in Physiology or Medicine in 1952. He was also the recipient of the Third Nobel Prize in Physiology or Medicine in 1952. He was also the recipient of the Third Nobel Prize in Physiology or Medicine in 1952.

Harriet Neville “Mimi” Limper (B.S. 1954) of Baton Rouge, LA, and formerly of Millstadt, IL, was born November 28, 1924, and passed July 15, 2010, at home. Limper graduated from the University of Illinois with a degree in chemistry. She was a retired technical writer for Ethyl Corp and an avid reader who loved to sew and do crossword puzzles. She was preceded in death by her husband, Arthur F. Limper; parents, Harry C. and Florence Neville Neville Devere; a brother, Howard Neville; and a sister, Genevaev Soupce. She is survived by her son, Arthur (Terri) Limper Jr.; daughter Anna Limper Burke; sister, Charlotte Crowe; brother, Donald Neville; five grandchildren, Travis Limper, Louise Limper, Megan Partt, Biannec Hart, Ryan Burke; Mackenzie Burke, and Caitlin Burke; four great-grandchildren, Forest Moore, Tray Simms, Zeke Limper, and Arribell Limper.

Dr. Pierre J. Marteney (Ph.D. 1961) of Manchester, CT, died January 18, 2010, at Hartford Hospital of a massive stroke. Born on New Year’s Day, 1922, in Lisbon, PO, he was the son of Reverend (Col.) C. Walton Marteney and Lorena Ruthie Marteney. He met his wife, Judith Catesy Gates, at the University of Illinois while earning a Ph.D. in physical chemistry. He spent his career as a research scientist at the United Aircraft Research Laboratories (now the United Technology, Research Center) where he specialized in catalytic combustion and fuel. Marteney was author and co-author of many scientific papers and reports, and a member of the American Chemical Society. In addition to his career as a professional scientist, Pierre had a lifelong love of music and stage, and was honored to be the recipient of the Third Nobel Prize in Physiology or Medicine in 1952. He was the recipient of the Third Nobel Prize in Physiology or Medicine in 1952. He was also the recipient of the Third Nobel Prize in Physiology or Medicine in 1952. He was also the recipient of the Third Nobel Prize in Physiology or Medicine in 1952.

John Thomas (Jack) Marvel (B.A. 1959) born September 14, 1938, in Champaign, IL, died on February 27, 2010, in Tucson, AZ. The son of Carl “Speed” Marvel, he earned his Ph.D.in chemistry from Massachusetts Institute of Technology in 1964, and was an assistant professor of chemistry and biochemistry of the University of Arizona until 1968. He left academia for the corporate world joining Monsanto’s Agricultural Products Company, attended the Stanford Executive Program in the Graduate School of Business in 1977, and from 1985 to 1987 was Monsanto’s General Manager of Science and Technology Europe/Africa, headquartered in Brussels, Belgium. In 1988 he joined Ethyl Corp. in Baton Rouge, LA, as Corporate Vice President for Research and Development until taking early retirement and moving to Tucson in 1995. Marvel served on the Secretary of Agri- culture’s User Advisory Board, Advena Europe Technical Advisory Board, BCC’s Biotechnology Group, as well as consulting for corporations and working with the American Chemical Society.

Paula S. Moffett (M.S. 1977) died May 10, 2010, along with her companion, Mark Nellen in Tuscola, IL. Moffett was an anesthesiologist for Medical Anesthesia Group. Previously, she was the director of the Division of Pulmonary and Critical Care Medicine and the Intensive Care Unit at St. Jude Children’s Research Hospital. She was a proponent of the arts, serving on the board of the contemporary art venue, Power House. Moffett was an avid traveler and participated in a number of medical missions to Peru organized by Dr. Doyle Shea. She is survived by her daughter, Lasley Bosansom (Morgan Martin) of Tuscola, IL, son, Daniel Bosansom of Memphis, her father and mother, Dan and Judy Moffett of Memphis, her sister, Dana Moffett (Chris Dubron) of Washington, D.C., and her brother, Pat Moffett (Sue) of Atlanta.