CHEMIGRAM

THE NEWSLETTER OF THE BRIGHAM YOUNG UNIVERSITY DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY • 2010

Message From the Chair

Paul B. Farnsworth

The reminder from our editor that it is time to write a chair's message for the Chemigram serves as another marker of the passage of a year. For me this anniversary is particularly meaningful because it marks the end of my second and final term as department chair. Greg Burton will assume leadership of the department on July 1 of this year (before you receive this newsletter). Adam Woolley and Steven Goates will serve as associate chairs. I am confident that the department will prosper under the leadership of these talented and dedicated men.

Academic departments develop unique cultures that can either enhance or detract from the educational mission of the organization. I was fortunate to be able to assume the leadership of a department with a culture of collegiality and commitment to excellence in both teaching and research. My interactions with other department chairs over the past six years and discussions of some of the challenges that they have faced have left me with a deep sense of gratitude for the excellent group of people with whom I have been able to work.

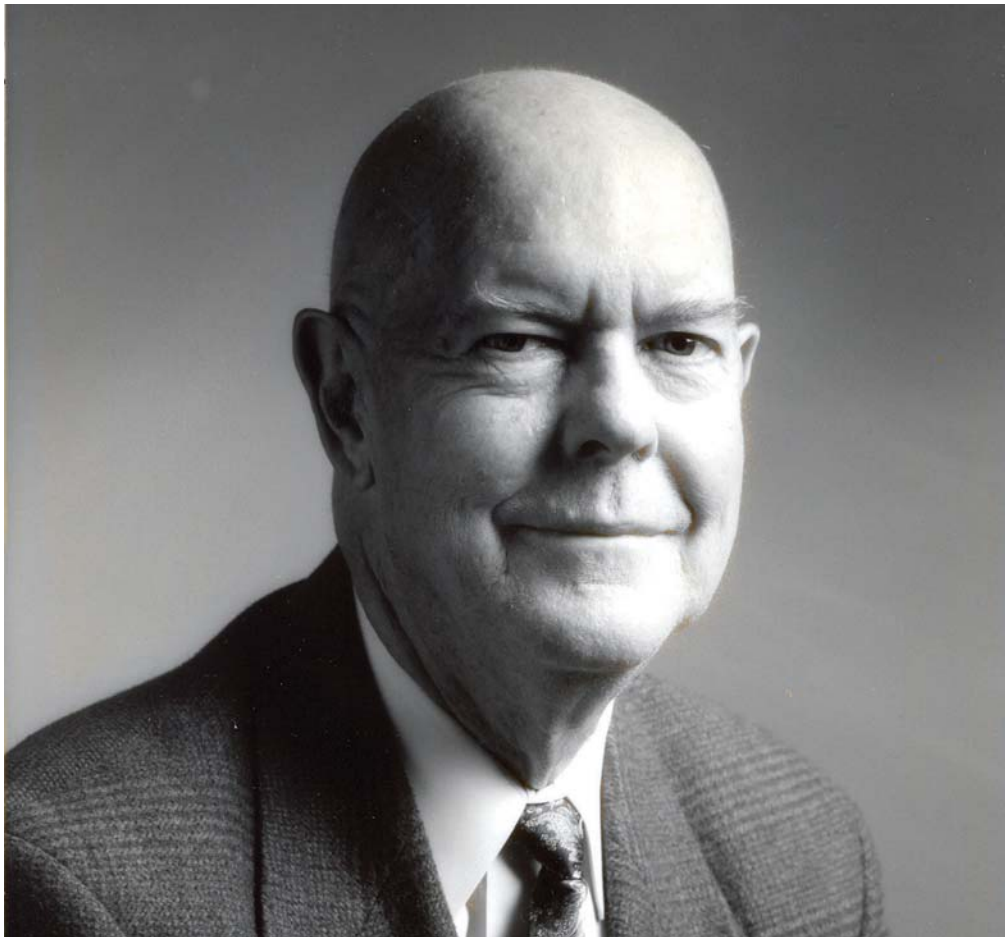
Students also contribute to the department culture. We are fortunate to have students who are well-prepared, who are eager to learn, and who relish the challenge of mastering a difficult subject. Each of you was once one of those students, and during your time in the department, you contributed to the successes that we now enjoy. As alumni, you continue to contribute in a variety of ways. Among them is the fact that your achievements as graduates of this department add value to the degrees that our current students will be earning.

We would like to hear about your accomplishments and to share them with others interested in the department. We recently made major changes to our department's website www.chem.byu.edu, and among the changes was the addition of a page for alumni and friends. The link is on the left side of our homepage. I would like to draw attention to two features of that page. In the upper right corner, there is a section on featured alumni. We would like to have a variety of stories for that section. To help us gather the stories, we have added the second feature, a link that allows you to share a story about yourself or another alumnus. Don't be shy! Let us know what you have accomplished and help us enrich the culture that has developed over the years.

Best Wishes,
Paul B. Farnsworth
Former Chair

NEWS

Dr. Reed M. Izatt Receives 2010 Special Recognition Award



Dr. Reed M. Izatt was selected as a recipient for the 2010 Special Recognition Award from the Brigham Young University Emeriti Alumni Association. The award was presented to him at an awards ceremony and luncheon Saturday March 6, 2010, by Stanley Peterson, President of the Association.

Each year the Emeriti Alumni Association honors outstanding alumni for their achievements, leadership, and service. The program for the awards ceremony included the following information about Dr. Izatt:

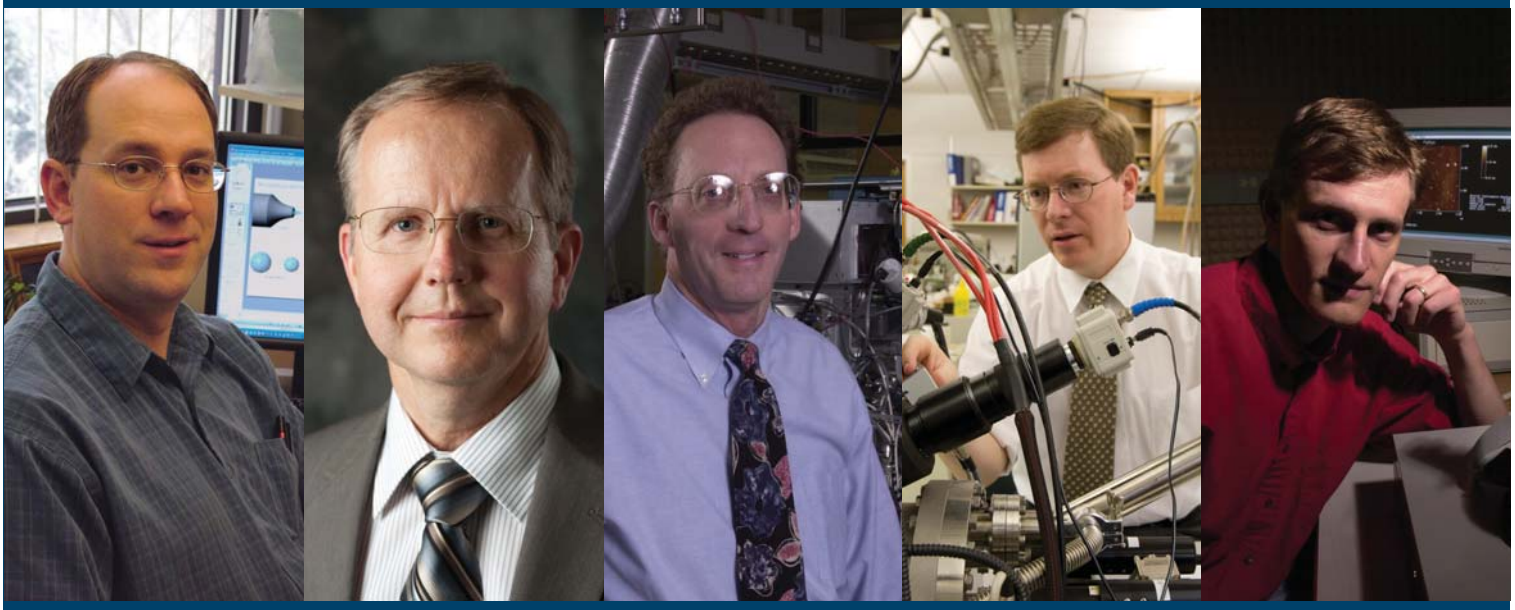
"Reed M. Izatt, who joined the BYU faculty in 1956, is an accomplished chemist whose research and teaching are recognized internationally. Outside research grants from government, industry, and private sources have largely supported his research and paid BYU millions of dollars in overhead funds."

In 1977 he and James J. Christensen established the International Symposium on Macrocyclic Chemistry, which meets annually worldwide. In 1988 he and colleague Jerald S. Bradshaw founded IBC Advanced Technologies, Inc., known internationally in the metal separations field.

Reed M. Izatt, who joined the BYU faculty in 1956, is an accomplished chemist whose research and teaching are recognized internationally

His research work at BYU has resulted in more than 560 publications. With his students and colleagues, he established a world-class research program. Professional awards and recognitions include: NIH Career Development Award; Annual Faculty Lecture, BYU; Utah Award, American Chemical Society; Fellow, American Association for the Advancement of Science; Huffman Award, Calorimetry Conference; Utah Governor's Medal for Science; American Chemical Society Award in Separations Science and Technology; First Annual Alumni Achievement Award, Utah State University, Department of Chemistry and Biochemistry. ■

Several BYU Professors Organize Symposia at Pittcon Conference & Expo in Orlando, Florida



AUSTIN FARNSWORTH LEE LINFORD WOOLLEY

PITTCON 2010
BRIGHAM YOUNG UNIVERSITY

BYU was very well-represented at this year's Pittcon Conference & Expo. Pittcon's website describes the event as "the world's annual premier Conference and Exposition on laboratory science." The list of participants from BYU who organized symposia includes: Paul B. Farnsworth, Adam T. Woolley, Daniel C. Austin, Matthew R. Linford, and Milton L. Lee.

The weeklong event took place Feb. 28 to Mar. 5 in Orlando, FL. It was organized by the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, a Pennsylvania nonprofit group that is made up of the Spectroscopy Society of Pittsburgh (SSP) and the Society for Analytical Chemists of Pittsburgh (SACP). The weeklong conference is an international event that attracts close to 20,000 people from 90 different countries.

Each year people from academia, government and industry submit proposals to a committee that chooses which symposia will be presented. There were 55 symposia during the conference, and 5 of those were arranged and headed by BYU Chemistry and Biochemistry professors.

Daniel Austin, *Mass Analyzers and Microfabrication Techniques*; Paul Farnsworth, *Atomic Spectroscopy: Where the Rubber Meets the Road (Society for Applied Spectroscopy);* Milton Lee, *Advances in Hand-portable Ion Mobility and Ion Trap Chemical Analyzers;* Matt Linford, *Emerging Materials in Separation Science;* Adam Woolley, *Affinity Methods in Biochemical Separations.* ■

Major Advances in Mass Spectroscopy Instrumentation for the Chemistry and Biochemistry Department

The past year has been filled with anticipation followed by realization of significant new mass spectroscopy capabilities. With the hiring of John Prince the department obtained funding for a new OrbiTrap from Thermo-Scientific. In addition Dave Dearden was able to arrange for the acquisition of a state-of-the-art 9.4 Tesla "SuperCon" FTICR mass spec.

The OrbiTrap opens up new areas of research not available anywhere on campus. It will allow broad new studies in biological mass spectroscopy. Proteomic and metabolomic studies that were not possible with our existing instrumentation can now become routine. One feature of the OrbiTrap is the ability to isolate a single ion then fragment and analyze the resulting ions and even further isolate again and analyze, so called MS/MS and MS^n. The MS/MS and MS^n available on the OrbiTrap are powerful new tools in the characterization of all sorts of biomolecules. This new instrument brings with it increases in sensitivity and resolving power that make it a marvelous addition to our robust (and increasingly state-of-the-art) departmental mass spec capabilities.

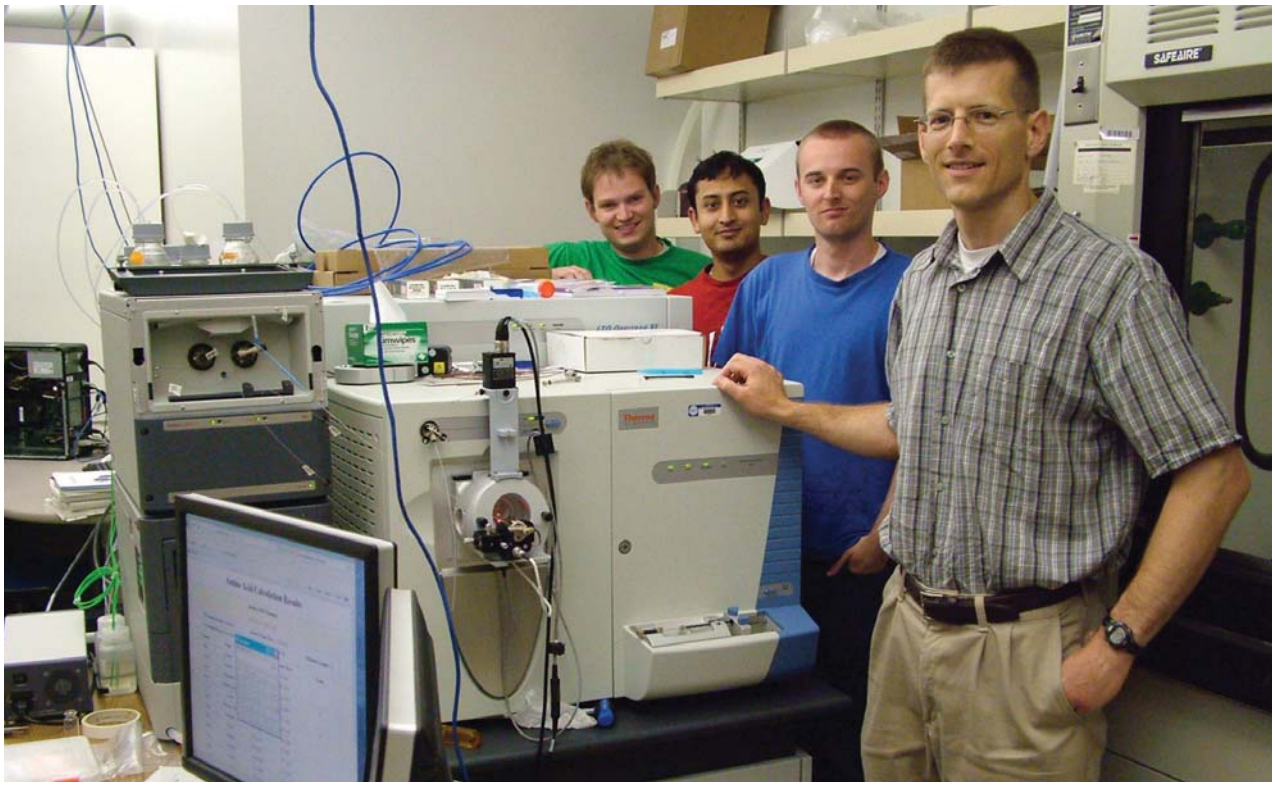
The new FTICR (Fourier Transform Ion Cyclotron Resonance) mass spec, under the supervision of Dr. David Dearden, is one of the most powerful magnets around. At 9.4 Tesla, it has ultra-high resolving power in excess of one million. At that resolution even very large proteins can be analyzed and characterized in ways not possible with any other instrument. Of course, Dr Dearden's purposes are more focused on the amazing capabilities to store ions and perform complex kinetics experiments. The new Bruker FTICR creates opportunities for research that are not available elsewhere on campus.

Our main departmental mass spec is the Agilent MSD-TOF (Mass Selective Detector, Time-of-Flight). It continues to run the lion's share of all samples for analysis. Organic researchers especially rely on this workhorse to verify reaction mixtures and characterize final products for publication. With its exact mass capability (within one or two PPM) products can be run and documented all with "walk up access". Student and faculty researchers walk up, log their samples and walk away with results in minutes. This is another of our remarkable state-of-the-art instruments expanding research capabilities and opportunities.

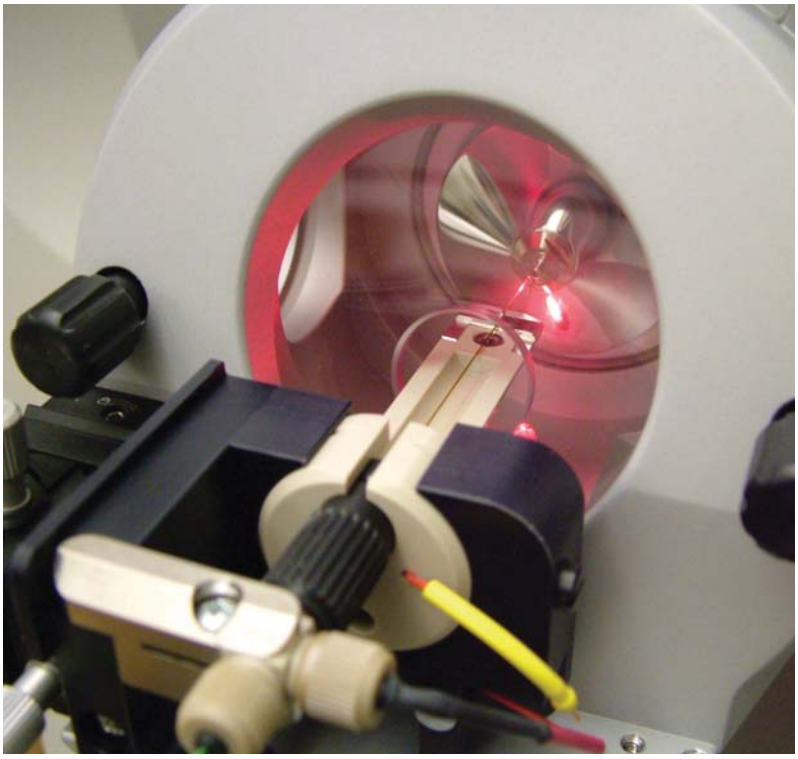
The QStar PulsarI is now one of the older instruments, but still running strong for biomolecule researchers. The Qstar is usually hooked up to a liquid chromatography system and is set up to run at microflow volumes which are sprayed into the source area at 4800 volts. Running this instrument in microflow ESI mode allows researchers to identify and characterize peptides and biomarkers even from complex mixtures with the micro LC column up front to separate the various components before analysis. This instrument also has a MALDI source that makes it compatible to run all sorts of large, and sometimes very large, molecules. It has enough resolving power to allow exact mass determination and to fully characterize researcher's products.

The TOF-SIMS may still be one of the only instruments of its kind in the intermountain west. Officially denoted as a time-of-flight secondary ion mass spectrometer, it has unique capabilities. It can analyze surfaces for anything from impurities to microscopic details of surface

The OrbiTrap will allow broad new studies in biological mass spectrometry.



Top: Professor Prince, Jesse Jashinsky, Aman Makaju and Ryan Taylor with the Orbitrap. Left: The Nanospray tip of the LTQ-Orbitrap XL.



structure. With the addition of our "cold stage" it can even be used to find details of biological samples. It can find anything from surface features of cells to the location within a cell where sodium or calcium is concentrated.

Our primary mass spec for the teaching lab is the PolarisQ. It is one of the older instruments and is still used for research as well as undergraduate instruction. As a standard GC-MS instrument it performs remarkably well with little down time.

Dave Dearden still maintains his older 4.7 Tesla FTICR which is used for a variety of kinetics and research support activities. It is a very reliable platform for many types of basic and applied research.

We, in the department, are most fortunate to have such marvelous instruments at our disposal. We can only hope to fully utilize our capabilities and expand even further on the state of the art facilities we now have. ■

RETIREMENTS

Barbara C. Hinshaw

Barbara C. Hinshaw retired from Brigham Young University on May 1, 2010 after 27 years of dedicated service to the Department of Chemistry and Biochemistry. Over the course of her career, Barbara has taught approximately 10,000 students, often with the help of able student instructors.

Barbara began work at BYU in 1983 as a research assistant in the laboratory of Roland K. Robins. A year later she was hired as an assistant manager of the Chemistry Central Stockroom. Three years later, she was hired as the first Chemicals Management Officer for the university where her duties included handling hazardous wastes for the university and maintaining the MSDS's for the Chemistry Department.

She joined the faculty as a lecturer from 1990 to 1996. Barbara was appointed to the professional teaching track in 1996. Since the appointment to lecturer in 1990, she has had sole responsibility for teaching the organic chemistry laboratory classes, Chem 353 and Chem 354. Barbara completely restructured the organic laboratory courses to introduce micro-scale techniques, she wrote laboratory manuals for the courses and introduced NMR to these courses. She later collaborated with Brian Woodfield to use the Virtual ChemLab as a way to teach the "whys" of chemistry. Barbara utilized six assignments that use virtual exercises to mirror and reinforce the concepts and skills taught in the real lab along with three virtual unknowns.

In addition, for many years she served as the Safety Officer for the Department and the liaison between the Chemistry Department and the University Safety Professionals. In that capacity, she also developed the first Chemical Safety Course on campus and taught it for many years to graduate and undergraduate chemistry students. The combination of teaching and safety management/training responsibilities represents an enormous contribution to the well-being of students and faculty across the campus.

Barbara has been a strong mentor for a number of women students, especially single moms, who have sought her advice and support.

Right now, Barbara lives in Spanish Fork, Utah but will soon be moving to Clinton, Utah to be near her children. Her hobbies are gardening, black Labrador dogs, sewing and reading. In fact, all of the plants in the department have benefitted by Barbara's constant care.

Barbara has performed a great service to the department and to the university, and she will surely be missed. ■

Barbara has performed a great service to the department and to the university, and she will definitely be missed.

It is with regret that we inform you of the deaths of two of our emeriti faculty H. Smith Broadbent (Jan 2010) and Leo P. Vernon (Jun 2010). Both men will be remembered for their significant contributions to the Department.

(See department website for obituaries.)

NEW FACULTY

Todd Bronson

Todd Bronson joins the faculty at BYU after teaching organic chemistry at the College of Southern Idaho since 2003. Dr. Bronson received both his BS (1996) and Ph.D. (2003) from BYU under the direction of Dr. Jerald Bradshaw and Dr. Paul Savage. His graduate work focused on designing real-time, reusable, metal ion sensors in aqueous solutions using crown ethers functionalized with fluorescent appendages. Dr. Bronson's work culminated in producing a cadmium sensor sensitive to submicromolar concentrations. As a faculty member at BYU, Dr. Bronson will primarily focus on improving undergraduate organic laboratory instruction. He has been tasked with updating and enhancing the already excellent lab experience that currently exists.

Dr. Bronson is a licensed contractor and has owned his own business for the last 10 years. While a student at BYU, he placed in the annual Student Entrepreneur of the Year competition. He has built a number of homes both in Utah and in Idaho. Dr. Bronson also enjoys many different sports, but he is particularly fond of basketball.

Dr. Bronson is married to JoyLynn Bronson (1996) and is the father of 4 children: McKaylee (14), Chante (10), Brielle (8), and Bryan (4). ■

John T. Prince

Johnn Prince joined the Department of Chemistry and Biochemistry in March, 2010. As an undergraduate at BYU he worked with Dr. Merritt Andrus synthesizing multi-drug resistance inhibitors. He also worked with Dr. Craig Thulin to design a mass spectrometry based screening assay. He joined the interdisciplinary Cell and Molecular Biology PhD program at the University of Texas at Austin for the opportunity to work with Dr. Edward Marcotte. While there he gained valuable experience as the main operator of an ion trap—and then an Orbitrap—mass spectrometer. During that time he developed skills in bioinformatics and systems biology, using computational techniques to solve problems in the analysis of large proteomic data sets. He recently completed postdoctoral work as a Howard Hughes Medical Institute Research Specialist in the laboratory of Natalie Ahn at the University of Colorado, Boulder. There, he studied signal transduction in melanoma and developed an in vivo cross-linking assay for capturing transient protein-protein interactions.

Here at BYU, the Prince laboratory runs a high-resolution, high-throughput mass spectrometer (an LTQ-Orbitrap XL) capable of identifying and measuring thousands of proteins in a single experiment. By integrating different measures of protein state into models of cellular behavior they hope to make significant contributions towards the understanding and cure of complex diseases such as cancer.

Dr. Prince's research is highly interdisciplinary and collaborative, offering distinct research opportunities to students. Besides a graduate and undergraduate student in biochemistry, he mentors students majoring in computer science, bioinformatics, mathematics, and neuroscience. He is working on projects in collaboration with several members of the Chemistry and Biochemistry department and others across campus. He is also a member of the BYU Lipidomics Team and a mentor in the IMPACT (Interdisciplinary Mentoring Program in Analysis, Computation, & Theory) program.

John and his wife, Melissa, have five boys. The family enjoys legos, reading, sports, the playground and long walks. He also enjoys mountain hikes, classical music, and programming. ■

Selected Undergraduate RESEARCH AWARDS

Marie Chilton

The Influence of Included Asymmetric Gases on the Dissociation of Energy of Cucurbituril Complexes

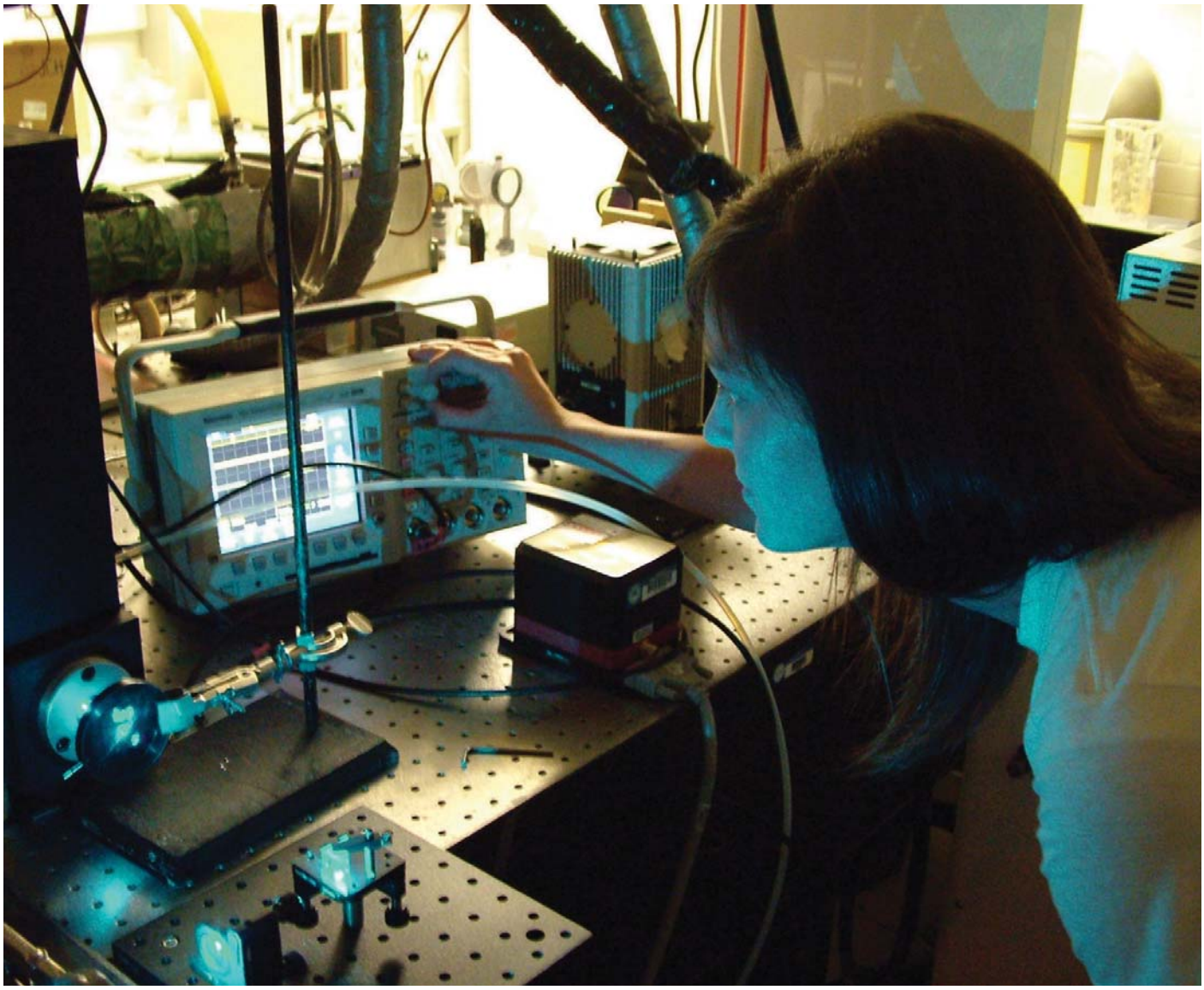
Brent McKay Allred, mentored by David Dearden

My studies under the direction of Dr. David V. Dearden found that asymmetric molecules such as carbon monoxide can indeed be trapped by the host cucurbituril molecule. In a recent preliminary experiment, trapped CO showed specific preference in dissociation prior to losing one of the metal lids at higher energies and often escaped after long periods of time, suggesting simple kinetic stability versus long term thermodynamic stability. Not enough data has been accumulated for publication yet, but the unique nature of asymmetric inclusion promises to yield interesting results. We will vary the metal lids, and perform time related dissociation experiments to further understand these effects. We will further probe these complexes by reacting them with ligands capable of removing the metal ion lids and an optical parametric oscillator (tunable infrared laser).

Development of a PhLP1 Conditional Knockout Mouse

Bradley Turner, mentored by Barry Willardson

This semester, I have been working in Dr. Barry Willardson's lab to develop a PhLP-knockout mouse. In this experiment, we "knock-out" or disable a gene that encodes for the PhLP protein in a mouse to see exactly what the PhLP protein does in the cell. Before we made the mouse, we needed to make sure the right DNA sequence was in the cells that would be inserted into a mouse mother. We used Southern blots to test almost 100 different cell colonies to find the right sequence. First, we extract the DNA and digest it with enzymes. Next, we separate the DNA, wash it with a probe that will identify the specific sequence, and view the results—the process takes about 3 days for each Southern blot. Just recently, we have identified two cell colonies that have the correct gene knocked out. This work will be submitted in a grant application that will fund the Willardson lab and will help us learn more about the different functions of the PhLP protein.



Kinetics of Atmospherically Important Radical-Molecule Complexes

Marie Chilton, mentored by Jaron Hansen

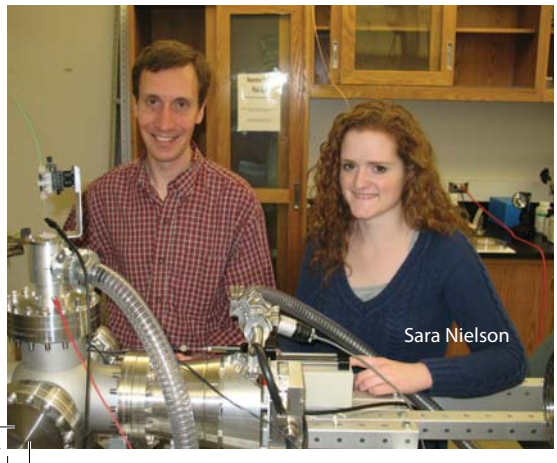
Organic peroxy radicals precede the formation of smog in the atmosphere. This semester we began validating our method for measuring the kinetics of the reactions involving organic peroxy radicals. In order to do this, we measured the kinetics of the HO_2 self-reaction: $HO_2 + HO_2 \rightarrow H_2O_2 + O_2$, and attempted to validate our procedure by comparing our results to known values. However, there are several other reactions occurring in the reaction cell when these measurements were taken such as the reaction of methanol and chlorine, producing HO_2 and the reaction of HO_2 with chlorine. In order to account for these secondary reactions, we used a computer program that solves systems of partial differential equations. We developed a procedure for data analysis using this program and collected data to determine the optimal conditions for measuring the kinetics of the reactions of interest.

Creation of HPLC Stationary Phases Using Diamond-Based Core-Shell Technology and Spherical Inorganic Particles

Sarah Copeland, mentored by Matt Linford

This semester my research focused on developing an HPLC stationary phase that is impervious to most system stresses. Diamond-based core shell technology has the potential to function at extreme pH, in a variety of organic solvents, and through a wide temperature

range. The core shell particles do not need restoration before reuse. They also offer a variety of functionalizations, and high reproducibility. We have created core shell particles using diamond and other spherical inorganic micron-size particles as the core. The particles were formed using a layer-by-layer deposition method; we have developed and tested HPLC columns using particles with different numbers of nanodiamond bilayers. We have achieved separations of multiple organic compounds. We are currently working on characterizing the particles and optimizing our separations by varying the particle size and solvent system. In a few short weeks we have been able to improve the column performance greatly, and have begun to test the method's versatility and stability over time.



Impact and Shock Survivability of Microorganisms

Sara Nielson, mentored by Daniel Austin

When looking for signs of extraterrestrial life, it is important that contamination from bacteria on the spacecraft don't interfere with detection. Although we try to completely sanitize the spacecraft, it is impossible to remove all contamination. Our research aims to test whether bacteria can survive the high-velocity impacts they would experience with a spacecraft crash. Over the last semester we've designed and built a new instrument to test electrospray as a technique for accelerating bacteria. The intended use of this instrument is to test whether the bacteria will survive the technique before we begin accelerating them. We've conducted extensive research to find out what people have done similarly with viruses and then modified those ideas into something that will work for our intended application. The instrument is almost fully assembled and should be in working order within the next month.

"Our research aims to test whether bacteria can survive the high-velocity impacts they would experience with a spacecraft crash."

In Vitro Activation of Human FDCs and Its Effect on HIV Infection

Sean Llewellyn, mentored by Greg Burton

Follicular dendritic cells (FDCs) are cells that are known to increase the infectivity of HIV in infected patients. The proteins CD21 and CD32 on the cell membrane attach to HIV covered in antibodies. The number of CD21 and CD32 proteins on the membrane are greater during HIV infection than when patients do not have HIV. These cell membrane proteins are thought to increase the infectivity of HIV, because these proteins trap HIV covered in antibodies on the FDC surface and allow HIV to infect CD4+ cells. FDCs first had to be extracted from human tonsils that were donated to our lab. Once these cells were extracted, they were used in activation experiments. To measure different levels of FDC activation, different concentrations of lipopolysaccharide (a common activator of immune cells) were used to measure the amount of CD21 and CD32 proteins on the cell membrane. These levels of activation will be used in future experiments as a comparison to the activation of HIV covered in antibodies at different concentrations. More research needs to be performed to determine if the proteins CD21 and CD32 on FDCs have a role in increasing HIV infection.

Synthesis of 2′,3′-bis-*O*-TBS-5′-ureidoadenosine and N^6-ethoxycarbonyl-2′,3′-bis-*O*-TBS-5′-ureidoadenosine

Curtis Bradford, mentored by Matt Peterson

This semester, I worked in Dr. Peterson's laboratory to create potential anticancer agents. Our goal is to eventually synthesize a library of potential anticancer agents characterized by compound 4 (2',3'-bis-*O*-TBS-N^6,5'-bis-ureidoadenosine). We began by making precursor compounds 1 and 2, which will be converted to compound 3 in a future semester. I learned several valuable laboratory techniques this semester, including flame-drying, celite plug filtration, low-pressure Rotovap evaporation, thin-layer chromatography, and column chromatography. I also learned some problem-solving skills in research. In preparing compound 2, we initially could only produce a 25.7% yield. After attempting several methods for most of October 2009, we found that by increasing the reactants, we could get up to a 76.6% yield. To make compound 1, we began with 2 grams of starting material, which needed to mix with the other reactants for 60 hours per reaction. In September, I synthesized 10.37 grams of compound 1, which will be enough to utilize and experiment with for next semester and the following year. Begin-

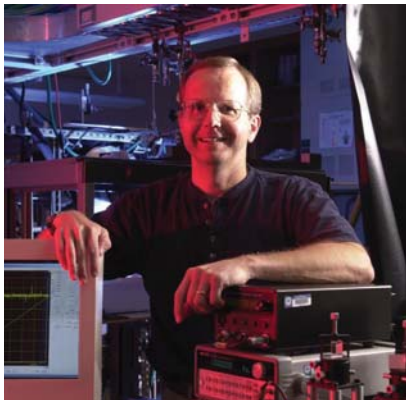
Sean Llewelyn

ning in October, I began synthesizing compound 2, but its starting material was both valuable and time-consuming to make, so I began with only 50 milligrams of starting material. As I improved the process, I moved to 100 milligrams and then to 200 milligrams of starting material. As of now, I have 693.9 milligrams of compound 2 synthesized, and I anticipate having another 520 milligrams before the end of the year. I began with a 90.3% yield of compound 1, which improved to 96.1% as I improved my laboratory skills. I would like to thank the Chemistry Department for its generous support through my Undergraduate Research Award.

Curtis Bradford

FacultyAwards

Paul Farnsworth



Paul Farnsworth received the Distinguished Service Award from the Society for Applied Spectrometry. The award was formally presented at the 2009 Federation of Analytical Chemistry and Spectroscopy Societies last year.

Dr. Farnsworth received the award primarily in recognition of his 12 years as editor of *Applied Spectroscopy*, a journal published by the SAS. In addition to serving as the journal's editor since 1997, he has also sat on several national committees and chaired the local intermountain section of the society.

He began his research career studying energy transport and excitation mechanisms in inductively coupled plasmas used as emission sources. In recent years, he has evolved into a mass spectrometrist. His work on ion transport in ICP-MS has been recognized twice with the Spectrochimica Acta Atomic Spectroscopy Award in 1998 and 2006. He also received the Lester W. Strock Award from the SAS.

The SAS is a nonprofit organization formed to advance and disseminate knowledge and information concerning the art and science of spectroscopy. Since its inception in 1958, SAS has remained committed to education and providing quality benefits to its 2,000 members.

In August 2009, Dr. Farnsworth was recognized by the University with the Karl G. Maeser Professional Faculty Excellence Award. This award recognizes outstanding achievement in fulfilling professional faculty responsibilities and is made possible by the generosity of the Karl G. Maeser Scholarship Society.

Milton L. Lee

Milton L. Lee was the first recipient of the Reed M. Izatt and James J. Christensen Faculty Excellence in Research Award. This award recognizes the research and accomplishments of a faculty member in the Department of Chemistry and Biochemistry in the College of Physical and Mathematical Sciences at BYU. Dr. Lee is best known for his research in capillary separations and mass spectrometry detection. He is a member of the Scientific Committee for the International Symposium on Capillary Chromatography. He is the author or co-author of over 500 scientific publications. Since 1980, he has given over 700 presentations on various aspects of his research, of which approximately one-third were invited lectures at major conferences and symposia.

Dr. Lee's current research activities cover several diverse areas including electric field gradient focusing of proteins, high speed thermal gradient gas chromatography, polymer monolithic column technology for liquid chromatography, sampling and concentration of target organic compounds in air, thermochemolysis/methylation of microorganisms for generation of characteristic biomarkers, toroidal ion trap mass spectrometry, and fluidic sieving of nano-particles. His research is mostly interdisciplinary in nature, involving faculty and students in Chemistry, Chemical Engineering, Statistics, Mechanical Engineering, Electrical Engineering, and Microbiology.

Professor Lee is also an entrepreneur and has been involved in transferring technology from his university research laboratory to the private sector. In 1984, he co-founded Lee Scientific to manufacture and market super-critical fluid chromatographic instrumentation. In 1991 he co-founded Sensar Corporation to manufacture and market unique time-of-flight mass spectrometric instrumentation. In addition, Dr. Lee acquired ownership of the *Journal of Microcolumn Separations* in 1991 and became the publisher as well as an editor for the next 8 years. He is listed as a co-inventor on 20 issued or pending patents. His most recent company is Torion Technologies Inc. which offers the world's smallest and most portable Gas Chromatograph-Mass Spectrometer System. It is a small, high-speed capillary gas chromatograph coupled to a miniature toroidal ion trap mass spectrometer (TMS), which provides rapid, high resolution separation and sensitive and selective detection of a wide variety of compounds at unit mass resolution over a range of 50-500 m/z.

Jaron C. Hansen

Jaron C. Hansen and his student research team were selected as finalists in the eighth annual Utah Innovation Awards.

Staff Recognition

Janet J. Fonoimoana

Janet J. Fonoimoana is the graduate student coordinator in the Chemistry and Biochemistry Department. She was selected to receive the President's Appreciation Award in recognition of her exceptional service, creativity, and competence. ■

A committee of 70 experts from Utah's private industry, government and academic communities selected the finalists in each of the program's eight categories. Dr. Hansen's team was selected in the Clean Technology and Energy category for their research on a biogas conditioner being used to purify methane gas produced in the composting of animal and human waste.

Matthew R. Linford

Matthew R. Linford was recognized by Brigham Young University with the Technology Transfer Award. This award recognizes faculty who have made significant research contributions that have led to the development of useful commercial products. He was honored for his involvement in the development of a next-generation computer optical disc capable of storing data for up to 1,000 years. Linford used his knowledge of materials, honed through his academic research, to help create the new disc from a combination of inorganic, incorruptible substances that can withstand the withering effects of heat and humidity. ■

Some Thoughts About Helping

by Brent Hall
Philanthropies Representative

If you would like to see how this type of giving could work for you, call our philanthropies representative, Brent Hall at 801-422-4501 or email him at brenth@byu.edu.

Donating to BYU and its colleges and departments is not limited by financial resources, marital status, or age. Those with great abundance and those with very little in the way of earthly possessions; families and individuals; and young and old alike share what they can to support these worthy causes.

Alumni and friends continue to support our Department of Chemistry and Biochemistry with gifts which provide additional opportunities to our students and programs. In the rapidly expanding global outreach of BYU these gifts provide the help to individuals and families that make possible future success and realization of potential.

By making charity a part of our lives, we experience growth and insight that cannot be obtained any other way.

One way to remember the University and the Department is to include in your will or trust a gift which will come from your estate. As you reach the time when you are establishing your estate giving plans, contact us and let us help you make a gift to the students and programs of the department. If you want to make a gift and have it endow a fund that will give an annual gift, that gift fund and the award can be named for you or someone you care about. Recently an alumnus established a scholarship in the name of a classmate of his undergraduate years. He named it for this classmate because the classmate had spent time helping him when he was feeling challenged by the rigors of undergraduate chemistry. This award will bless lives for years to come. Thanks for all you do! ■

2010 StudentAwards

Undergraduate Student Awards

The following awards consist of a cash award plus an 8 GB flash drive.

Undergraduate Analytical Division
Recognizes an outstanding junior student with aptitude in analytical chemistry. The award consists of a plaque and an 8-month subscription to Analytical Chemistry.
Sara Nielson

Catalyst Club Award
Presented by Carole Harrison
Recognizes an outstanding junior female student in chemistry or biochemistry. This is a cash award.
Hannah Shaw

Freshman Chemistry Major Award
Molly Clemens

Freshman Chemistry Non-Major Award
Morgan Hardy

Organic Chemistry Major Award
Jonathan Scoville

Organic Chemistry Non-Major Award
Susan M. Folsom

Chemistry Literature Award
Amy Felsted

Chemistry Education Award
Emily A. Smith Finley

Hypercube Scholar Award
Marie Chilton

Physical Chemistry Award
Aaron Pulsipher

Biochemistry Award
Amy Felsted and Matthew Winterton

Analytical Chemistry Award
Sarah Winterton

Inorganic Chemistry Award
Lee Allen

Eliot A. Butler Service Award
Sara Copeland

Keith P. Anderson Outstanding Senior
Allen Nicholson Jason Nielson

UNDERGRADUATE RESEARCH AWARDS FOR SPRING AND SUMMER
Sixty-six students received undergraduate research funding awards for Spring or Summer 2010 terms.
The following students received special research funding awards for outstanding research proposals:

James A. & Virginia S. Ott Undergraduate Research Award
Nathan Wilde

Glenda L.M. Harr Undergraduate Research Award
Joseph Mosley

Graduate Student Awards

The following are cash awards.

Spring Research Conference
Recognizes the top presenters in the chemistry sections of the Spring Research Conference. Awards consist of a cash award from the ACS and the College of Physical and Mathematical Sciences.
Ammon Eaton Allen Nicholson
Robert Hilton Elisabeth Pound
Steven Kearnes Matthew Rowley
Jeffrey Lai Jadd Shelton
Nitesh Madaan Stacey Smith

Jennie R. Swenson Award
Jonathan Lee David Petrucci

Loren & Maurine F. Bryner Award
Matt Heywood Elisabeth Pound
Dan Li Chad Rogers

Telford & Frank Woolley Memorial Research Award
Amy Gray

Garth L. Lee Award
Robert Hilton

Outstanding Graduating M.S. Student
Joshua Robinson

Outstanding Graduating Ph.D. Student
Jesse Contreras Jacolin Murray

GRADUATE RESEARCH FELLOWSHIPS

Stanley & Leona Goates
Full research assistantship for Spring/ Summer 2010.
Caleb Hiller

BYU Graduate Studies
Half-time research assistantship support for the 2010-2011 academic year.
Mickey Miller Yong Wang

Bradshaw Organic Chemistry
Half-time research assistantship support for the 2010-2011 academic year.
Yanshu Feng

Roland K. Robbins
Full research assistantship support for the 2010-2011 academic year with a cash supplement.
Tanielle Alvarez Fan Yang
Alexander Curtis Chun Wan Jeffrey Lai
Brad Loertscher Betsy Olsen

Charles E. & Margaret P. Maw
Full research assistantship for the 2010-2011 academic year with a cash supplement.
John Hunter

BYU Homecoming 2010 Events

Please mark your calendars and plan to renew your friendships in the department at our homecoming activities as follows:

Department of Chemistry and Biochemistry Activities on October 8

6:00 p.m.	Reception
6:30 p.m.	Dinner
7:30 p.m.	Presentations/Magic Show

University Activities

Homecoming Spectacular, October 7 & 8 (Marriott Center)

Homecoming Parade and Breakfast along parade route, October 9 (downtown Provo)

Homecoming Game – October 9 at 4:00 pm, LaVell Edwards Stadium, BYU vs. San Diego State

Homecoming Dance – October 9

Below is a reservation form for the Department Homecoming activities. Please mail your reservation form to Homecoming, Department of Chemistry and Biochemistry, C-104 BNSN, Brigham Young University, Provo, UT 84602, or email to marcia@chem.byu.edu. Reservations should be made no later than September 28, 2010.

ResponseCard

I plan to attend:

Reception & Dinner,
Friday, October 8, 6:00 pm
Reserved seating.

YES ☐ NO ☐

Number attending _____

Number who are BYU Alumni _____

(Please include yourself in both totals.)

Name: _____

Address: _____

City, State, Zip: _____

E-mail: _____

Contact telephone: _____

(Please RSVP no later than September 28)

CHEMIGRAM

THE NEWSLETTER OF THE BRIGHAM YOUNG UNIVERSITY DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY • 2010

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