

# CHEMIGRAM

THE NEWSLETTER FOR BYU'S DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY • AUGUST 2011

## Message from the Chair

Gregory F. Burton



It seems hard to believe that it's been a year since my appointment as department chair. During this time I have become much more aware of the important contributions made by our students, staff, faculty and you, the alumni of the Department. I appreciate that this Department is what it is because of the contributions of so many

of you over the years. Thank you for your contributions and your continued interest and support.

I thought it might be of interest to you to share the Department's mission and some of the highlights of the past year:

*The Department of Chemistry and Biochemistry at BYU strives to integrate undergraduate and graduate education in a manner that provides an exceptional educational experience for our undergraduate students, offers opportunities in research at the cutting edge of our disciplines for our graduate students, and creates an environment conducive to excellence in scholarship and teaching for members of our faculty. We are committed to providing effective, rigorous, learning experiences for all our students, both majors and non-majors, in and out of the classroom. Undergraduates have access to a variety of meaningful research projects in well-equipped and well-funded laboratories under the direction of faculty who are current in their disciplines. In those same laboratories graduate students work with undergraduate students on significant research projects as they prepare themselves to work as independent scientists. Post-doctoral research associates participate with and extend the reach of faculty members in providing mentoring to undergraduate and graduate students. Our research efforts should produce discoveries that move science forward and contribute to society in meaningful ways.*

*It is our goal to create a department toward which the best LDS undergraduate and graduate students will gravitate because of the high quality of the instruction, the range and quality of the learning opportunities outside the classroom, and the combined faith and scholarly excellence of the faculty.*

### HIGHLIGHTS OF 2010:

- "YChem" - BYU's student chapter of the ACS - received a national "runner up" award for commitment and achievement
- Brandon Gassaway, a graduating senior performing research on Andersen-Tawil syndrome (causes periodic paralysis, changes in heart rhythm and developmental defects) with Dr. Emily Bates (biochemistry), received a prestigious NSF graduate research fellowship. Brandon is now attending Yale University as a first-year graduate student in the Biological and Biomedical Sciences program
- Department faculty were awarded over \$5 million in external research funding - an increase of \$1 million above that received in 2009.
- Faculty and students published 97 peer-reviewed articles, 3 book chapters and made 220 major presentations
- Drs. Daniel Austin and Jaron Hansen received Continuing Faculty Status (CFS) and advancement to Associate Professors and Dr. Scott Burt was granted candidacy for CFS
- Dr. Daniel Ess was appointed as a Principal Investigator of the Center for Catalytic Hydrocarbon Functionalization (CCHF), a prestigious energy frontier research center funded by the U.S. Department of Energy.
- Dr. Joshua L. Price joined the department as an assistant professor of organic chemistry.
- One hundred seventy-three undergraduate research awards were made to support mentored research within the department totaling \$144,000.

While we continually strive to improve, we're pleased with our progress during the past year and look forward to a productive 2011-12. In behalf of the Department, I thank you for your continued support and for your excellent representation of BYU. I look forward to visiting with you at our annual Alumni Dinner, Friday evening October 7<sup>th</sup>.

### Gregory F. Burton

Professor and Chair  
Department of Chemistry and Biochemistry  
Brigham Young University  
Provo, UT 84602  
Office (801) 422-4917

# News



*Left to Right: Dr. Milton Lee, Dan Li, and William Goodman. William Goodman is a chemist from PerkinElmer and was the one who presented the Ettore Award to Dan Li.*

## Graduate Student Receives Leslie Ettore Award at International Symposium

**B**YU had a great showing at the 35th Annual International Symposium on Capillary Chromatography in San Diego May 1-5 with one student awarded the prestigious Leslie Ettore Award and three more recognized in the top 10 presented posters, Professor Milton Lee said. “Students could always work harder,” Dr. Lee joked. “[But] I believe they are good students and they have worked hard to accomplish these goals, these achievements, and I’m pleased with their performance.”

Dr. Lee said he has taken students to the symposium before. This year, out of the seven in attendance, five presented their research along with hundreds of other students, professors and scientists at every level from all over the world.

“I think [the symposium] was a really good experience because it opened their eyes to what other people are doing and how competitive the field is,” Dr. Lee said. “I’ve noticed an increase in enthusiasm to work hard to achieve. So I think it’s good to expose students to the cutting edge research in their areas so they know what they’re involved in.”

The Ettore Award is presented to a promising young scientist 35 years or younger who presented the most interesting original research in capillary gas chromatography. Six to eight prominent scientists are chosen to act as judges and

attend all the talks and poster presentations given at the conference. These judges then vote on which scientist receives the award. The award includes a \$2,500 research grant and \$1,000 travel contribution to and free registration for the next ISCC meeting in Italy. The winner is also invited to give an oral presentation on their research at the next meeting.

This year, the Ettore Award went to fourth-year BYU graduate student Dan Li. Li, who is from China, earned a master’s degree in microbiology prior to coming to the United States to study chemistry. She spent two years working on microfluidics in Dr. Lee’s lab before moving to an anti-terrorism project researching the detection of biological warfare agents. She hopes to graduate with her PhD in August 2012.

“Dan Li bridges between microbiology and chemistry,” Dr. Lee said. “She’s working with micro-organisms, bacteria and also with chemistry – analytical chemistry.”

Dr. Lee explained that as part of the anti-terrorism project, Li has been involved in the development of a hand portable gas chromatograph mass spectrometer system for detecting chemical warfare agents. In order to adapt the instrumentation to detect biological warfare as well, she has to develop and optimize the chemical treatment methods and then to identify specific biomarkers for different bioweapons like anthrax. Li also works on an interdisciplinary team involving microbiology professor Dr. Richard Robison and statistics professor Dr. Dennis Tolley, as well as students from both fields.

“When you’re looking at a lot of samples and biomarkers, you need to involve statistics for recognizing trends and patterns and quality of the data,” Dr. Lee explained.

Li said in an e-mail she was surprised and honored when her name was announced as the winner of the Etre Award because there were so many excellent talks.

“It is good for me to combine my biological background with analytical chemistry which could provide me broader vision and more job opportunities,” Li said. “In Dr. Lee’s group, I found a perfect project [where] I can use my microbiological knowledge very well and learn new things in [the] analytical area. I would like to give my special thanks to my advisor, Dr. Milton Lee, who provided this great opportunity [for me] to work in his group and encouragement to overcome many obstacles. I would also like to thank our department for giving me this offer to make my dream come true.” ■

## Turning China’s Waste into Renewable Energy

**T**wo BYU chemistry professors have been using their knowledge of bacteria to turn waste into energy for quite some time, and now they’re taking their craft on the road – to China!

Jaron Hansen, a professor in the Department of Chemistry and Biochemistry, and Lee Hansen, an emeritus faculty member from the same department, recently traveled to the world’s most populous country to unveil the biogas conditioning system they built for the Chinese government.

The conditioner is currently being installed on a dairy farm outside Shanghai and will function as part of a larger anaerobic digestion system to produce renewable energy for on-site use. This system will also include two large Induced Bed Reactors (or IBRs), which will be used to turn cow manure into methane gas. The professors’ biogas conditioner will then purify that gas, stripping out any harmful elements and converting it into compressed natural gas that can be used to power the dairy’s vehicles as well as burned to produce electricity.

During their time in China, the professors attended a ribbon-cutting ceremony to unveil the new system. They were joined at the ceremony by Utah Governor Gary Herbert, who attended as part of a previously scheduled economic trip to the country, as well as several Chinese provincial governors.

“I’m delighted to be able to participate in this event during



*Jaron Hansen and Lee Hansen in front of their Gas Conditioner with the head engineer on the site.*

our trade mission to China,” Herbert said of the ceremony. “This project embodies Utah’s entrepreneurial spirit of innovation and partnership, and I commend both Dr. Jaron Hansen and Dr. Lee Hansen for their hard work and determination that ensured this day would come to fruition.”

The professors stayed in China for 10 days to install the biogas conditioner and make sure the whole system runs smoothly.

*Continued on next page.*

Continued from page 3

But Jaron Hansen is less concerned about the product working than he is about actually getting it into the country.

"It costs more for us to ship [the conditioner] to China than it does for me to fly over there," he said. "It only costs me \$800 to fly over to China and back, and it costs \$2300 just to ship the biogas conditioner one way.

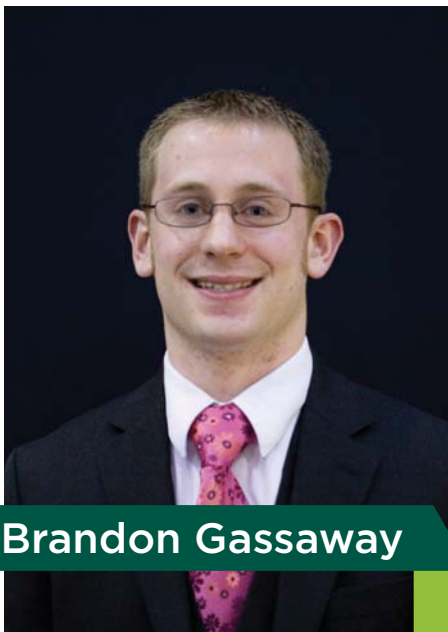
"Then again," Hansen added, whimsically, "it also weighs 1,000 pounds, which is a quite a bit more than what I weigh."

Any shipping costs, however, are only temporary concerns that won't deter either of these professors — Jaron Hansen says the pair currently plan to install up to three additional biogas conditioning systems in the Shanghai area in 2011.

"It's absolutely worth it," he said of the time and energy expended on each system. "We're making the world a better place!" As part of the spread of the Hansens' conditioner, Jaron Hansen attended a signing ceremony in Washington, D.C. on May 10 in which Gov. Herbert signed an EcoPartnership agreement with the Qinghai Province of China on behalf of the state of Utah. Among other things, the agreement will further the ecological work with the biogas conditioner in China. The ceremony took place alongside the third annual U.S.-China Strategic and Economic Dialogue, at the Department of State.

"We have covered a lot of ground together," Secretary of State Hillary Clinton said. "For example, there is now a new partnership that will bring U.S. and Chinese companies and universities together. Those which are developing innovative environmental technologies will now be working bi-nationally and with local governments and non-governmental organizations to promote sustainable development projects such as next generation batteries for electric cars, and new clean air and water initiatives." ■

## General Interest



Brandon Gassaway

**B**randon Gassaway, who graduated in biochemistry spring 2011, received a graduate research fellowship from the National Science Foundation Graduate Research Fellowship Program. The grant was awarded to him due to a research proposal he wrote and will fund his PhD studies at Yale University in the fall. Gassaway was mentored by Emily A. Bates researching the genetics behind Andersen-Tawil Syndrome, a rare, dominantly inherited episodic disorder that is characterized by periodic paralysis, heart arrhythmia and developmental abnormalities.

"I'm proud of the work that Brandon has done and how he worked to maintain his own funding through Undergraduate Research Awards, ORCA grants, and now one of the greatest honors in the nation to an upcoming PhD student, a National Science Foundation Fellowship," Dr. Bates said. She is currently writing a paper about the conclusions she and her research group, including Gassaway, drew from their research.



D. Clark Turner with Gov. Gary Herbert

### D. Clark Turner

**O**REM — D. Clark Turner, President and CEO of Aribex, Inc. was awarded the Utah Governor's Medal for Science and Technology by Gov. Gary Herbert at Discovery Gateway, February 27. Dr. Turner received his B.S. and Ph.D. degrees in analytical chemistry from Brigham Young University in Provo and spent the next 12 years working in radiology, developing several commercially successful x-ray products prior to founding Aribex. In October 2010, Aribex was ranked No. 28 by the MountainWest Capital Network (MWCN) in the "Utah 100," an award honoring the 100 fastest growing companies in the state. Aribex is making a name for itself worldwide with Dr. Turner's invention, the NOMAD Handheld X-ray System and other handheld x-ray products. This innovation has improved dental care in "countless remote humanitarian clinics around the world," according to a news release by Aribex, Inc.

## YChem



The student chapter of the American Chemical Society at BYU, the YChem Society, was awarded a student chapter honorable mention at the ACS National Meeting in Anaheim, Calif., March 2011. It also broke the record for largest number of undergraduate students to present in the conference from the Department of Chemistry and Biochemistry with 17 students presenting research in a poster session or talk. YChem advisor Daniel E. Austin was pleased so many students got to experience sharing their research, especially the seniors.

Sara Pratt, a senior from Las Vegas, said she was impressed with the quality of other YChem members' presentations and appreciated her own opportunity to share the culmination of her research at BYU.

"I loved the opportunity to present at a national conference," Pratt said. "I was able to talk to people who were interested in my work and get exposure on a national level, which I wouldn't have had otherwise."

## Brian F. Woodfield



Department faculty member Brian F. Woodfield, his programming team and partnering professors recently launched the Virtual Biology lab with Pearson Education in fall 2010. The program will provide lab experience for more high school and college students worldwide. Woodfield has created virtual labs for multiple scientific disciplines including chemistry, which was launched in 2004.

## Samuel Tartakoff



IRVINE – BYU alumnus Samuel Tartakoff, now a graduate student in his second year at the University of California, Irvine, was recently awarded a National Science Foundation Fellowship.

Tartakoff graduated from BYU with a Bachelor of Science degree in 2009. While at BYU, Tartakoff worked in Steven L. Castle's lab, where he and graduate student Fang Li worked together to accomplish the first laboratory synthesis in the world of acutumine, a naturally occurring compound that has potential as an anti-amnesic agent (i.e., memory aid). As a result of his fine work, Tartakoff co-authored two papers with Professor Castle and Fang Li. The National Science Foundation Fellowship will fund the next three years of his program.

# Selected Undergraduate Research Awards

## Application of Global Quantitative Phosphoproteomics to Identify the Relative Post Translational Changes in Proteins in Brain Cells of the Casein Kinase I $\delta$ (CKI $\delta$ ) Wild Type and CKI $\delta$ -T44A Mutant Type Mouse

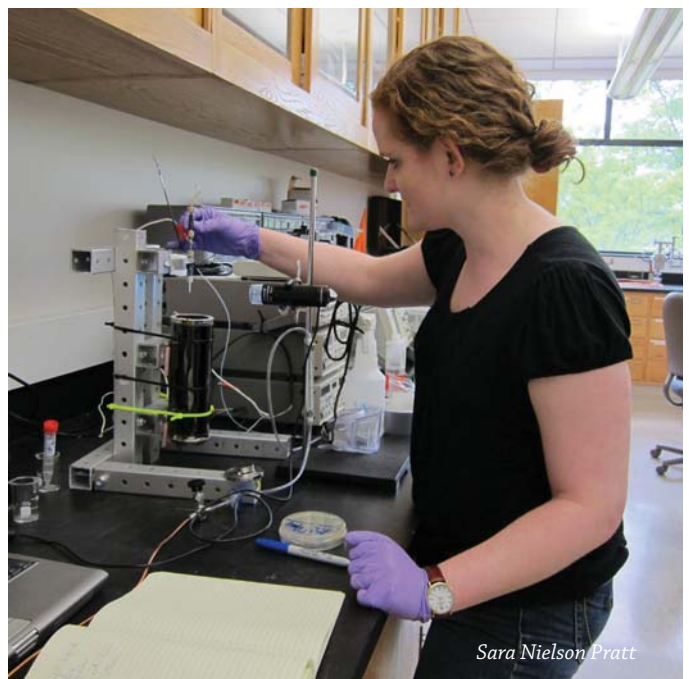
Aman Makaju, mentored by John Prince

The underlying factors contributing to migraine are poorly understood. Emily Bates' laboratory studies mice expressing an aberrant human gene that causes migraines. The mutation in this gene, CKI $\delta$ -T44A, suggests that differences in phosphorylation, the primary mechanism of signaling in cells, may play a major role in migraine. In collaboration with Aaron Sahim, a graduate student in the Bates lab, we are working to analyze the global phosphorylation pattern in mice with migraine.

Global phosphorylation analysis involves tissue homogenization, protein digestion into peptides, and the enrichment of phosphorylated peptides (phospho-peptides). Finally, phospho-peptides are separated by ultra-high performance liquid chromatography (UPLC) and analyzed in our Orbitrap mass spectrometer. We have worked out a phospho-peptide enrichment method and a method enabling the relative measurement of phosphorylation levels. We have optimized nearly every step in the sample processing pipeline and now have the ability to work with multiple mouse brain samples. We have worked to streamline our UPLC system and compared methods to fragment and identify phospho-peptides in the Orbitrap. We can now identify greater than 1500 phospho-peptides belonging to more than 1000 phospho-proteins. When completed, this will be the first phospho-proteomic analysis of migraine and stands to make clear many of the cellular mechanisms responsible for this debilitating ailment.



*Aman Makaju and  
Dr. John Prince*



*Sara Nielson Pratt*

“For these measurements, we used a Quantum Design Physical Property Measurement System we recently acquired that allows us to collect heat capacity data much more rapidly.”



*Katie Andrus Pulsipher*

## Electrospray of Bacteria

Sara Nielson Pratt, mentored by Daniel Austin

This semester with my URA I have been working with Dr. Daniel Austin. We have been trying to see if bacteria can survive the electrospray process in order to use this as a method to electrically charge the bacteria for subsequent experiments. In electrospray, a liquid solution containing analyte (molecules, bacteria, etc.) is sprayed into fine droplets in the presence of a strong electric field. Once the solvent evaporates, the remaining analyte is electrically charged. Electrospray is commonly used to ionize large biomolecules for mass spectrometry. We electrosprayed *E. coli* directly onto a metal plate and also into a tube with opposing gas flow and electric fields. We found that *E. coli* survived this process, although the bacteria may have been

either agglomerated (clumps of many bacteria, with the outer layer protecting the inner bacteria) or incompletely desolvated. The next step in our research is to see if they can survive complete solvent evaporation. We are constructing an improved electrospray source to allow us to address this question. This research was presented at the CPMS Spring Research Conference and in a poster at the ACS National Meeting.

## Investigation of ZnO Phase Purity Using $C_p$ Measurements

Katie Andrus Pulsipher, mentored by Brian Woodfield

For my Undergraduate Research Award for fall of 2010, I worked on a project collecting heat capacity data on bulk zinc oxide (ZnO). Measurements on

bulk ZnO were part of a larger project of understanding the changes in miscibility of ZnO in CoO at the nanoscale. Earlier measurements had suggested that there was a phase transition at 150 K, and such a transition in a simple solid such as ZnO was surprising. We felt it was necessary to repeat these measurements on a newer, better sample over the temperature range of 2 K to 300 K. For these measurements, we used a Quantum Design Physical Property Measurement System we recently acquired that allows us to collect heat capacity data much more rapidly. After the data was collected, I analyzed the data and can easily show that the previous anomalous transition was an artifact of the measurements and is not intrinsic to ZnO. I am currently finishing the analysis on the sample and will publish these results in the *Journal of Chemical Thermodynamics*.

## Searching and Characterizing Nascent Peptides that Cause Ribosome Stalling

Shankar Parajuli, mentored by Allen Buskirk

Ribosomes are molecular machines that make proteins in all living cells. Surprisingly, some proteins interact with the ribosome in such a way that they inhibit their own synthesis. These stalling events can regulate the synthesis of other proteins found downstream on the same messenger RNA. They can also affect the rate of synthesis of the protein, and thereby affect its function. To better understand the scope and mechanism of ribosome stalling, we developed a genetic tool in bacteria to identify new stalling peptides. We validated this selection and

“To better understand the scope and mechanism of ribosome stalling, we developed a genetic tool in bacteria to identify new stalling peptides.”

identified 14 new sequences that stall ribosomes. We are currently in the process of characterizing these new sequences to understand their significance in the cell. I presented my research in the most recent Spring Research Conference at BYU. It allowed me to share my findings to the audience and answer their questions.



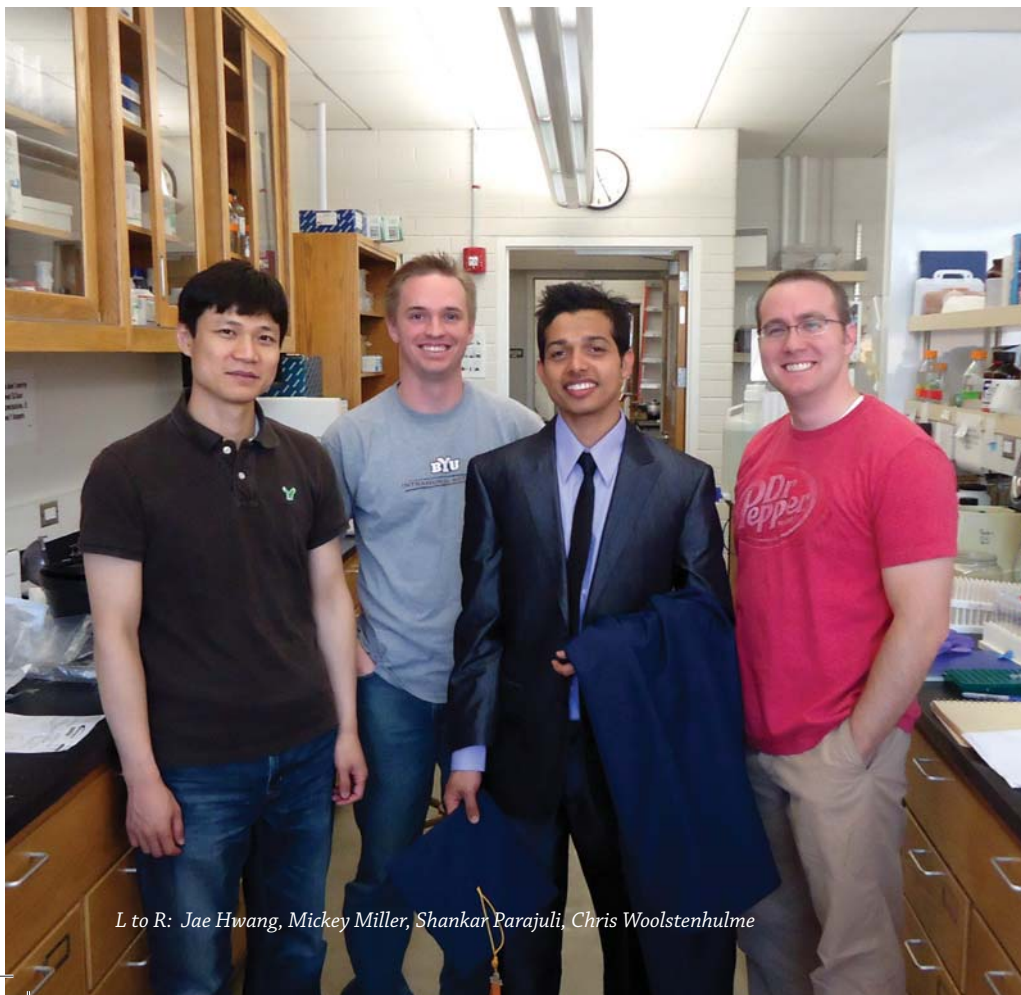
Abhilasha Acharya and  
Dr. Milton Lee

The involvement in this research has increased my love for science, and I have learned to appreciate the beauty of research. I am grateful to the department for funding my research throughout. It has become one of the most valuable experiences I had during the course of my undergraduate study.

## Detection of Biothreat Bacterial Species Using Thermochemolysis/ Methylation and Gas Chromatography-Mass Spectrometry

Abhilasha Acharya,  
mentored by Milton Lee

The specific aspect of the project on which I worked was finalizing the thermochemolysis and gas chromatography-mass spectrometry protocols for producing fatty acid methyl ester profiles, dipicolinic acid methylester and some sugar derivatives. Thermochemolysis involves adding reagents and heat to samples containing bacteria in order to convert their structures into unique chemical biomarkers. Thermochemolysis is followed by gas



L to R: Jae Hwang, Mickey Miller, Shankar Parajuli, Chris Woolstenhulme



chromatography-mass spectrometry to separate the chemical biomarkers and identify them so that chemical fingerprints are available to identify the specific bacteria. My work included optimizing the thermochemolysis parameters such as buffer type, concentration, and pH, as well as methods for transferring samples to the gas chromatograph-mass spectrometer for analysis. Apart from the laboratory skills that I learned last semester, I am more confident and skilled in using chemical analysis instrumentation and Chemstation software. Using these skills, I was able to produce and analyze the data from the experiments. After performing several experiments and analyzing the results, I finally learned that the best buffer is phosphate buffer with a concentration of 1 M at pH 6.5. The results led to the discovery of two new sugar biomarkers. Based on the presence and absence of these two sugar biomarkers, *Bacillus Anthracis*, more commonly known as anthrax, can be differentiated from all other bacterial species.

## Self-Polymerizing DNA Origami as a Nanowire Thermoelectric Materials Template

Matthew Halbert, mentored by Adam Woolley

We successfully developed a structure for application in nanoelectronic circuitry. Specifically, I created a nano-sized shape that can be used to make a DNA wire. Using DNA, I first created an origami structure (DNA folded into an engineered shape) by manipulating the sequencing of many short DNA "staple strands." These strands could then "staple" a long piece of DNA into a "V" shaped building block. On one side of the structure, a "lock" was built into the DNA's encoding sequence



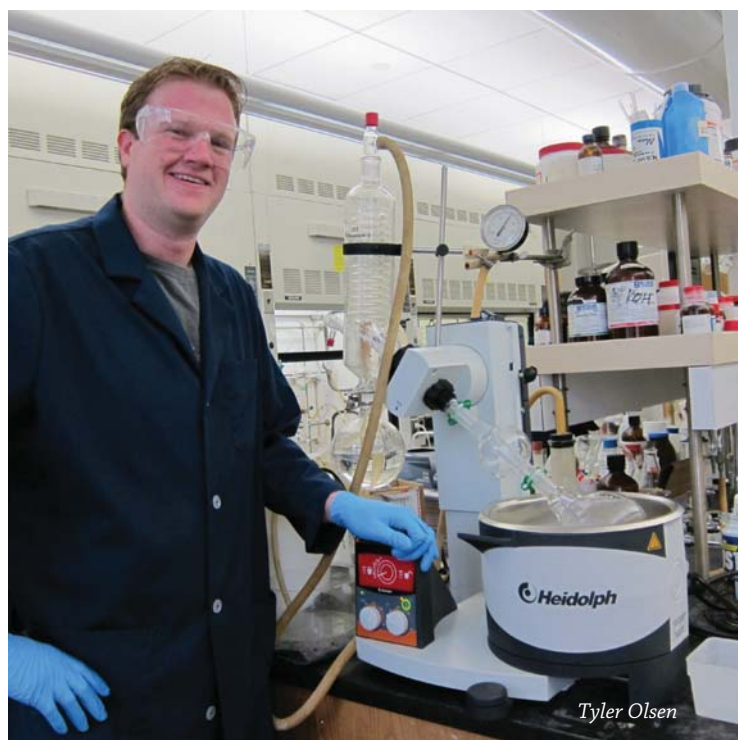
Matthew Halbert

to allow for the "key" of another origami structure to fit into. This key was created by having a single strand of DNA extend from the end of an origami structure, with the coding sequence of the DNA matching the lock. Origami structures containing a key and a lock on opposite ends could then link together when exposed to other copies of itself. Just like how a key can be made to fit only one way into a lock, the extended staple strands of an origami structure were made to prefer forming a zig-zag shape over a "U" shaped chain. We showed successful linking into a zig-zag shape, although structures are often distorted when deposited on a surface from solution. It was found that in order to make chains longer than 6 subunits, three factors were required: origami units and chains had to be formed at the same time, a protocol that involved slow cooling was required to discourage box formation, and a high concentration of raw DNA was needed to generate long chains. In conclusion, we have demonstrated that a V-shaped DNA subunit can be designed and linked together, creating a stable zig-zag structure that is useful in nanoelectronics.

## Synthesis and Purification of the Glycosphingolipid CSA-13

Tyler Olsen, mentored by Paul Savage

This past semester my research involved synthesizing new forms of CSA-13, a non-peptide mimic of antimicrobial peptides which prevents bacteria from growing on contact lenses, and modifying its structure to control elution (the leaking of CSA-13 into your eye) from contact lenses. To control elution from lenses, we varied the length of a carbon chain on the CSA. CSA-13 has an eight-carbon chain, and adding additional carbons to this chain resulted in a new CSA that eluted from lenses over a longer period of time. Use of this new CSA prevents bacteria from growing on contact lenses for extended periods of time.



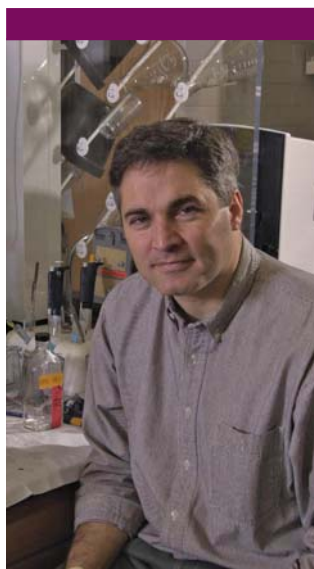
Tyler Olsen

# Faculty Awards



## Paul B. Savage

Paul B. Savage became the second 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.



## Barry Willardson

Barry Willardson was awarded the Sponsored Research Recognition Award at the recent Annual University Conference for his work on important research conundrums in medicine and health. This award recognizes faculty members who demonstrate outstanding achievement in scholarly activities funded by external sponsors or who give significant service in support of sponsored research and creative programs.



## Daniel H. Ess

Daniel H. Ess, one of the department's newest faculty members, was recently appointed to the Center for Catalytic Hydrocarbon Functionalization, a prestigious energy frontier research center funded by the U.S. Department of Energy. He was also recognized by the American Chemical Society with an award for his research in hydrocarbon chemistry.



## Juliana Boerio-Goates

Juliana Boerio-Goates was presented with the Utah Award in Chemistry by Tom Richmond of the American Chemical Society's Salt Lake Section at an awards banquet, August 2010. Her research has focused on thermodynamics. Her lab is one of only four in the world with the capacity to measure the entropy of pure materials.

## Staff Recognition

### Kim Christensen

Kim Christensen is the business manager in the Department of Chemistry and Biochemistry. He was selected to receive the Outstanding Staff/Administrative Employee Award at the College Awards Dinner, January 2011.





### Matthew C. Asplund

Matthew C. Asplund received the Alcuin Fellowship. This award recognizes outstanding teacher-scholars whose work at the university transcends the limits of their disciplines and who have made significant contributions to the general education and honors curriculum.



### Emily A. Bates

Emily A. Bates was recently awarded the Thomas E. Heftler Migraine Research Award by the American Headache Society and the Migraine Research Foundation for her research in understanding the molecular mechanisms causing migraine headaches.



### Paul Farnsworth

Paul Farnsworth received the Distinguished Faculty Citizenship award at the College Awards Dinner, January 2011. Paul served as the department chair from 2004-10.



### Jennifer Nielson

Jennifer Nielson received the Excellence in Teaching award for faculty with 3-10 years of service at the College Awards Dinner, January 2011.

## Give Back

**W**e constantly receive letters from former and current students who have received financial support through scholarships, mentorships, and grants. The content of their messages always has a similar ring --- "Thanks for the help. I couldn't have finished without it."

Many of us remember the same feelings of receiving help at just the time we needed it to continue our education. It not only keeps food on the table, and the possibility of getting married and having children while going to school, the support makes it possible to realize our dreams and potentials. It changes families for generations. Those changes ripple through villages, cities, and nations.

If you want to make a change in the world, consider giving to BYU. Your gifts to the BYU Chemistry Department will answer prayers, and provide support to some of the finest young people in the world. You can give now by sending a gift, or later by including the BYU Chemistry Department in your will or trust. To make a gift or to discuss what you want to do, contact Brent Hall at [brenth@byu.edu](mailto:brenth@byu.edu), or call 801-422-4501. You'll never regret being generous.



*Brent Hall,  
Philanthropies Representative*

## Emeritus Recognition



### Delbert J. Eatough

Delbert J. Eatough, received the Frank A. Chambers Excellence in Air Pollution Control Award from the Air & Waste Management Association at its 103rd annual conference and exhibition in Calgary, Canada, June 2010. This award is presented to an individual with outstanding achievement in the science and art of air pollution control. Specifically, Dr. Eatough was given the award for his research contributions “in the areas of fine particulate measurement, characterization, and source apportionment,” according to an article in the Environmental Manager, A&WMA’s monthly magazine for environmental managers.



### Eliot A. Butler

Eliot A. Butler, an emeritus department faculty member, was the co-recipient of the new “Distinguished Pillar” Award, October 2010. Dr. Butler was recognized by Earl Woolley specifically for his important contributions to the current department curriculum.



### Douglas J. Henderson

Douglas J. Henderson, an emeritus department faculty member, has been awarded the title “Doctor honoris causa” (honorary doctorate) from the Institute for Condensed Matter Physics of the National Academy of Sciences in Ukraine.



### J. Rex Goates

J. Rex Goates, an emeritus department faculty member, was the co-recipient of the new “Distinguished Pillar” Award at the Alumni Homecoming Dinner, October 2010. The award, given by the Department of Chemistry and Biochemistry chair, honors emeritus professors whose valuable contributions to the department make them “pillars” to build on. Dr. Goates was recognized by Francis Nordmeyer specifically for his example and vision that shaped the culture of the department today.

D

r. Dan Ess joined the Department in July, 2010. He received his Ph.D. at the University of California, Los Angeles in computational chemistry working under K. N. Houk. During his time at UCLA he developed several new theories of reactivity and selectivity for organic and organometallic reactions. He was also trained for two years as a part of the UCLA materials creation and training IGERT program. After UCLA, he was a postdoctoral scholar for two years concurrently at The Scripps Research Institute-Scripps Florida and the California Institute of Technology where he undertook fundamental computational studies of C-H bond activation and prediction of homogenous catalysts for methane to methanol conversion. After this appointment he was then a postdoctoral scholar at the University of North Carolina at Chapel Hill as part of a solar fuels and next generation photovoltaics energy frontier research center.

Here at BYU, Dr. Ess' computational lab undertakes research efforts ranging from investigation of mechanisms and reactivity for small molecule activation, organic and inorganic catalysis, asymmetric and stereoselective reactions in silico catalyst design and chemical physics. In the past year, studies from the Ess group have already led to a number of high-impact publications. Dan is currently a principal investigator in the center for catalytic hydrocarbon functionalization, an Energy Frontier Research Center funded by the Department of Energy.

Dan and his wife, Emily, have two children. Madison is five and Henry is two.

## New Faculty



**Daniel H. Ess**

# STUDENT AWARDS

## ACS Analytical Chemistry Junior Award

*Recognizes an outstanding junior student with exceptional aptitude in analytical chemistry.*  
Cy Credille

## Catalyst Club Award

Presented by Randalynn Macedone  
*Recognizes an outstanding female junior student in chemistry or biochemistry. This award is sponsored by the Catalyst Club, an association of women who are current or emeritus members of the department or spouses of current or emeritus members.*  
Katherine Elizabeth Redd

## Freshman Chemistry Major Award

Sadie Hirschi  
Kurt Leininger

## Freshman Chemistry Non-Major Award

Meredith Gaufrin

## Organic Chemistry Major Award

Matthew Nielsen

## Organic Chemistry Non-Major Award

Micah Turney

## Chemistry Literature Award

Katie Andrus Pulsipher

## Hypercube Scholar Award

Matt Winterton

## Physical Chemistry Award

Jacob Hedelius

## Biochemistry Award

Steven Kearnes

## Analytical Chemistry Award

Sara Nielson

## Inorganic Chemistry Award

Aaron Pulsipher

## Eliot A. Butler Service Award

Sam Matthews

## Keith P. Anderson Outstanding Graduating Seniors

Amy Felsted  
Aaron Pulsipher

## UNDERGRADUATE RESEARCH AWARDS FOR SPRING AND SUMMER

Thirty-seven students received undergraduate research funding awards for Spring or Summer 2011 terms. The following students received special research funding awards for outstanding research proposals:

## James A. and Virginia S. Ott Undergraduate Research Award

Thomas Cook

## Glenda L.M. Harr Undergraduate Research Award

Nathan Bushman

## Spring Research Conference

*Recognizes the top presenters in chemistry sections of the Spring Research Conference. Awards consist of a cash award from the ACS and the College of Physical and Mathematical Sciences.*

Debolina Chatterjee  
Taylor Cline  
Garrett Edmunds  
Corey Ellis  
KC Erb  
Joel Everett  
Jared Hancock  
Marie Killian  
Rebecca Plimpton  
Chris Woolstenhulme

## GRADUATE STUDENT AWARDS

The following are cash awards.

## Jennie R. Swensen Award

Vinod Chaudhary  
Chris Woolstenhulme

## Loren & Maurine F. Bryner Award

Zhiwei Ma  
Elisabeth Pound  
Anzi Wang  
Jie Xuan  
Fan Yang

## Telford and Frank Woolley Memorial Research Award

Chad Rogers

## Garth L. Lee Award

Brian Anderson

## Outstanding Graduating Ph.D. Student

Stacey Smith

## GRADUATE RESEARCH FELLOWSHIPS

## Stanley & Leona Goates

*Twenty-hour research assistantship support for Spring and Summer 2011*

Chad Jones

## BYU Graduate Studies

*Half-time research assistantship support for the 2011-2012 academic year.*

Na Li

## Bradshaw Organic Chemistry

*Ten-hour research assistantship support for the 2011-2012 academic year.*

Mark Acerson

## Roland K. Robins

*Twenty-hour research assistantship support for the 2011-2012 academic year with a cash supplement.*

Pankaj Aggarwal  
Taylor Cline  
Brad Loertscher  
Jadd Shelton  
Chris Tracy

## Charles E. & Margaret P. Maw Fellowship

*Twenty-hour research assistantship support with a cash supplement*

Mickey Miller

# Homecoming Events

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

## Department of Chemistry & Biochemistry Activities on October 7<sup>th</sup>

- |           |  |
|-----------|--|
| 6:00 p.m. | Reception  |
| 6:30 p.m. | Dinner   |
| 7:30 p.m. | “A View from a Chemistry Classroom”<br>Talk by Steven Haderlie |

## University Activities

Homecoming Parade & Breakfast along the parade route  
October 8 (Downtown Provo)

Homecoming Game BYU vs. San Jose State  
October 8 (LaVell Edwards Stadium. Time TBA)

Homecoming Dance  
October 8 Wilk Ballroom & Studio 600 in Provo

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](mailto:marcia@chem.byu.edu). Reservations should be made no later than September 28, 2011

I PLAN TO ATTEND:

### Reception & Dinner,

Friday, October 7, 6:00 pm  
*Reserved seating*

YES NO

Number attending \_\_\_\_\_

Number who are BYU Alumni \_\_\_\_\_

**(Please include yourself in both totals.)**

## RESPONSE CARD

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City, State Zip: \_\_\_\_\_

E-mail: \_\_\_\_\_

Contact telephone: \_\_\_\_\_

PLEASE RSVP NO LATER THAN SEPTEMBER 28

Research



News



Awards



THE NEWSLETTER FOR BYU'S DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY • AUGUST 2011

# CHEMIGRAM



Brigham Young University  
Department of Chemistry and Biochemistry  
C-100 Benson Science Building  
PO Box 25700  
Provo, UT 84604-5700