CATALYST

Spring 2019

Department of Chemistry
Science at Its Source

Department of Chemistry
COLLEGE OF SCIENCE | THE UNIVERSITY OF UTAH

Distinguished Alumni 2019: Bill Jack (New England Biolabs), Michelle Williams (Arkema), Kurt Zilm (Yale University)

In This Issue:

Interviews with Distinguished Alumni
Michelle Williams
Kurt Zilm
Bill Jack

Honoring Joel Harris
Hatch Prize
Graduate Endowment

Methane-Eating Bacteria
Aaron Puri's Research
New Faculty Member

Churchill Scholar & Student Achievements
Cambridge, Braunshweig, and Research Labs

CATALYST

Joel Harris — Endowed Graduate Scholarship — 3

Faculty Research — Methane-Eating Bacteria — 4
Aaron Puri

Honoring — Distinguished Alumni 2019 — 6

Students — The Future of Chemistry — 14

Chemistry

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LETTER FROM THE CHAIR CINDY BURROWS

Dear Friends of Utah Chemistry,

Above is a view from the other side of Utah's iconic arch. To get there, you head up the usual trail, but at the top of the big open slab of sandstone, you turn right, leaving the beaten path, and then scramble up a rocky outcrop to a precipitous point SW of the arch. From the point, you have an uncommon view of a magnificent structure.

Of course, I show this photo from a hike Scott and I did last November because it's a metaphor for what we are trying to accomplish in the Department of Chemistry: *uncommon views of magnificent structures* are what we hope to see in the lab every day, and *views from the other side* are educational goals in the classroom to get beyond textbooks and wikis. As the semester ends and graduation ceremonies near, we are proud of our accomplishments in the classroom and the lab this past year. The number of B. S. students graduating this spring is up 18%, the overall number of majors is up 6%, the number of incoming graduate students for Fall '19 is up 30%, and federal research dollars are robust, although the federal shut-down delayed some start dates, making exact comparisons difficult.

Diversity is also on the rise in Chemistry; this summer we'll add our 10th tenure-line woman faculty member, Jessica Swanson (biophysical theory), and an offer is out to number 11. Members of underrepresented groups continue to join our ranks at all levels from undergraduate through faculty. Importantly, they are award-winning teachers and researchers.

Alumni have played monumental roles this year by donating to the Simons Endowed Chair (55 individual gifts so far). Mike and Sally Hunnicutt surprised Joel Harris on Valentine's Day with the announcement of the Harris Endowed Graduate Scholarships. Retiring Distinguished Professor Dale Poulter and Professor of Law Susan Poulter established an endowed professorship in their names. We are grateful to all!

Our donors have been able to further advance our department's impact on the world, whether it be a building for our faculty and students, a chair for an accomplished faculty member, or a scholarship that allows us to recruit brilliant students. Your contributions have made a tremendous positive impact on the Department, that will in return, have a great impact on society. Thank you for your investment in us!

In this issue, read about award-winning science and scientists, and learn about efforts to transform the educational experience. Students, faculty and staff are doing amazing things, with help from your efforts as alumni and supporters of our goals. Our distinguished alumni event was particularly poignant as we reunited Bill Jack, Michelle Williams and Kurt Zilm—students of the '70s-80s—for celebratory events.

This is my last issue of the *Catalyst* for which I write as Department Chair; on July 1st, after 2 x 3-year terms, I will hand over the keys to Distinguished Professor Matt Sigman to lead us to new heights. Looking back, this has been a period of growth, not so much in size as in quality. Huge strides have been made in solving energy-related problems, developing new catalysts and materials, treating antibiotic resistance and understanding cancer. Personally, I look forward to a sabbatical stay at the Curie Institute in Paris; Scott will spend time in Adelaide, Australia—how's that for poor planning on the map! Nevertheless, we'll be back and forth and participate here in Salt Lake when we can, and I hope to remain in touch with you.

Thank you for the great journey!

Cynthia J. Burrows
Distinguished Professor and Department Chair
Thatcher Presidential Endowed Chair of Biological Chemistry

Faculty Awards

Ryan Steele

Robert W. Parry
Teaching Award
Endowed by the
Brady Foundation

Marc Porter

Entrepreneur Honoree for
Technologies for
Diagnosing Infectious
Disease & Cancer

Joel Harris

University of Utah
Hatch Prize for Teaching

Shelley Minteer

ECS
David C. Grahame Award

Holly Sebahar

College of Science
Award for
Teaching Excellence

Luisa Whittaker-Brooks

DOE
Early Career Award

Shelley Minteer

Fellow of the American
Association For the
Advancement of Science

Valeria Molinero

University of Utah
Distinguished Scholarly &
Creative Research Award

Luisa Whittaker-Brooks

ACS
"Talented 12"

Michael Grünwald

NSF
Early Career Award

Rodrigo Noriega

Daniels Fund Award for
Leadership in Ethics Education
by the
David Eccles
School of
Business

Luisa Whittaker-Brooks

2018 Emerging Investigator
Award
Journal of Materials Chemistry

Michael Morse

OSA
William F. Meggers Award

Department of Chemistry

Science at Its Source

Luisa Whittaker-Brooks

2019 Scialog Collaborative
Innovation Award
Research Corporation for
Science Advancement

Harris Endowed Graduate Scholarship

Valentine's Day 2019 turned out to be a memorable day for Professor Joel Harris. Not only did he hear the news that he had received the Hatch Teaching Prize (the University's most prestigious teaching award), but he was also surprised by a vistit from a former student, Michael Hunnicutt, and his wife Sally. At the conclusion of Joel's Distinguished Faculty Colloquium lecture, Dr. Hunnicutt announced that he and Sally would be establishing an endowment to support graduate students in the analytical chemistry program in honor o f Joel's extensive influence on many people's lives and careers.

This generous gesture is evidence of the strong connections built and fostered through the Department of Chemistry as well as Joel's legacy as the founder of the Analytical Chemistry Program at the University of Utah over forty years ago.

Throughout four decades, his dedication to teaching and mentorship has contributed to the success of more than 2,500 students who have learned from him in the classroom and over 100 undergraduate and graduate students, postdoctoral associates, and collaborators who have done research in his lab.

Please join us in supporting analytical chemistry graduate students

To make an online pledge or gift, please visit

chem.utah.edu/community/donate.php

For more information about multi-year pledges, or for any questions concerning your gift or pledge, please contact

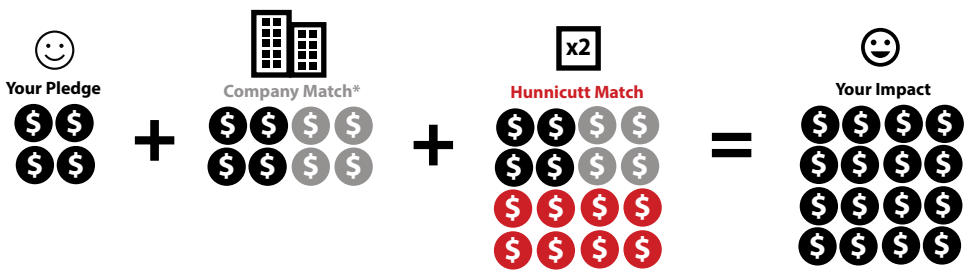
Jeff Martin at (801) 581-4852

Thank you for your support!

Hunnicutt Matching Pledge

In addition to Michael and Sally Hunnicutt's generous $100,000 lead gift, they have also pledged to match contributions to the fund up to an additional $100,000.

* In the past, some of our donors have been pleasantly surprised to learn that their companies will match charitable donations.



New Faculty: Aaron Puri

Methane-Eating Bacteria

Chemical Ecology: How Bacterial Communities Sequester Methane

Just like there are good bacteria that exist in our gut microbiome to help us control our weight, fight infection, and regulate our sleep, there are good bacteria within the earth microbiome that strive to keep their environment healthy. The Earth Microbiome Project has identified around 300,000 unique microbial 16S rRNA sequences–a significant catalogue.

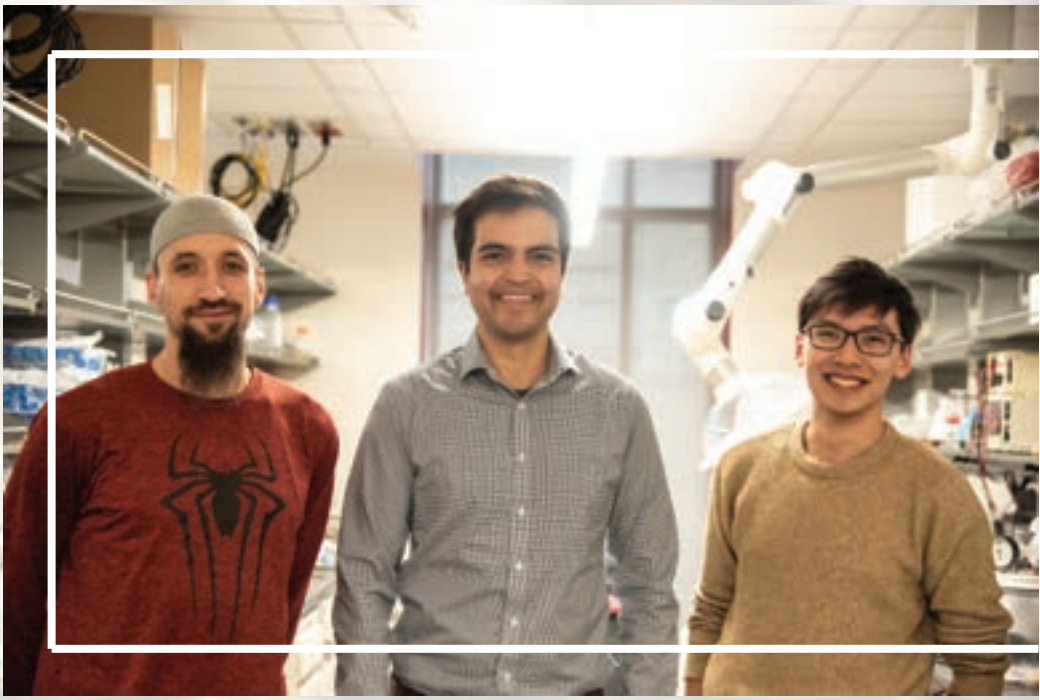
The Puri Lab Research Project

Groups of bacteria are responsible for many important processes on earth, from human health to carbon cycling. While a great deal of progress has been made identifying the bacterial species that are involved in these activities, in most cases how these bacteria actually interact remains a mystery. We are interested in determining the molecular details of how these bacteria interact with each other and their environment.

Beyond Mapping & Into the Chemistry

Puri's lab is at the forefront of understanding how these bacteria interact to perform this important ecosystem function. Their experiments go beyond the list of microbial sequences and investigate interspecies interactions in order to discover new natural products and determine how these compounds are biosynthesized. This will then lead to the discovery of new chemistry that can be used to make novel compounds from renewable feedstocks in the future.

"A list is a nice starting point, but we need to go further."



His lab, located in the Crocker Science Center, isolates the greenhouse gas-eating bacteria in Puri's experiments in order to get a more mechanistic understanding of how they use small molecules to interact. whether they're signaling molecules, or go out and grab nutrients or antibiotics to affect their environment.

Introducing Oxygen: How to mimic the natural environment

Bacteria need both oxygen and CH_4 (methane) to live in an environment. Rather than conducting experiments only in test tubes, Puri is re-introducing oxygen into his process in order to mimic the bacteria's natural environment. With a syringe as an auger, he can add methane to the tests, allowing oxygen to surface so the bacteria can grow where they would naturally. By doing so, he has observed that the first thing the bacteria do is turn methane into methanol.

Puri at The U

Dr. Puri came to the University of Utah in January 2019. He completed his B.S. at the University of Chicago, his PhD at Stanford University School of Medicine, and his post-doctoral research at the University of Washington in Seattle where he was co-mentored by Mary Lidstrom and Pete Greenberg and worked on genetic tools and chemical signaling in methane-oxidizing bacteria as part of an NIH K99 Pathway to Independence Award.

The draw to the University? The people in the chemistry department and the opportunity for interdepartmental collaboration (although maybe the mountains had something to do with it as well).

DEPARTMENT OF CHEMISTRY

Lifetime achievements.
Lifelong community.

Distinguished Alumni 2019

Michelle Williams

Bill Jack

Kurt Zilm

PhD 1987

Michelle Williams

Global Group President
Arkema

"There are always people who see something in you."

Michelle's story sounds like it must have been deliberately calculated and executed. How else does someone go from Jamaica at an all-girls boarding school to college in New York City to graduate school at the University of Utah to Global Group President of Arkema, a billion-dollar subsidiary of Altuglas International? Turns out, Michelle had zero plans whatsoever to lead an international company along her career path. Instead, she thought she might like teaching. As she says, "Plan A never works out, and sometimes it's Plan H or Plan G that finally works!"

She came to the University of Utah after breezing through college so much so that it was all a blur, and she found herself in Dr. David Grant's research group at the age of 19. "I had no idea what I was getting into." She, like most 19-year-olds, was looking for adventure and eagerly said goodbye to her teary-eyed mother at the airport. Michelle was checking off her adulting list: she rented an apartment–her own place; figured out her schedule; supported herself on her teaching and research stipend; and she made her way, "I mucked my way through it."

Michelle is emphatic that "this is where I grew up." Only second to her decision to have children, coming to the University of Utah Chemistry Department was the best decision she ever made. Despite her overwhelm when she began her graduate research, she was quick and willing to ask for help, and she's continued to do so throughout her entire career. "The reality is that I have always found that there are people who will help you. There are always people who see something in you."

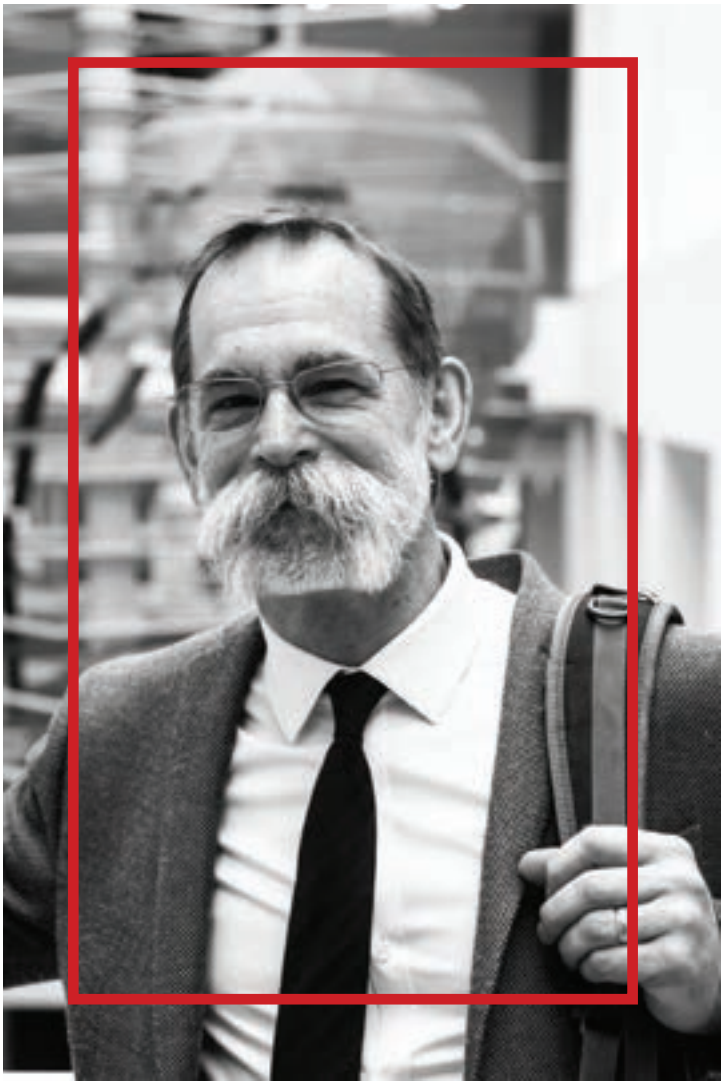
As she was completing her PhD research and dissertation defense, Michelle began casually interviewing with companies while she waited for her experiments to finish. She turned down a job offer from Dow Chemical though the interview was one of the most impactful conversations she would have about her career. The interviewer advised her, "young lady," at which Michelle rolled her eyes, "you're going to have opportunities and opportunities, and you need to find a company that has the right personality to match your personality." She eventually accepted an offer from Rohm and Haas.

The job at Rohm and Haas was a continuation of the sense of community she had come to love at the University of Utah. It was a small enough, family-owned company where she could build relationships, and the focus was on learning, training, development and growing people. From a young age, Michelle has developed and followed her core values through every step of the way.

PhD 1981

Kurt Zilm

Chair, Professor
Yale University



As Yale's current Chair of the Chemistry Department, it seems clear that Kurt has always understood what the foundation of a successful chemistry department is built on: human connection, collaborative research, and investment in students. As a graduate student in Dr. David Grant's research group at the University of Utah, Kurt also took advantage of Professor Ted Eyring's time, knowledge, and generosity. In hindsight, Kurt realizes he had a unique and intimate look into how academia worke, and how this Chemistry department allowed him to grow steadily into the position as Chair of the Chemistry Department he now has at Yale. He's spent the past 16 years as the Director of Undergraduate Studies at Yale University, and has committed to creating an environment for students that allows them to indulge their curiosity--just as he was able to do with Professor Eyring.

After being at Yale for 38 years, Kurt has recently been part of a renaissance in their College of Science as they renovate and build facilities that give all students the opportunities and experiences they need in order to establish themselves as serious chemists and innovators. The department's investments have made it possible for every undergraduate in organic chemistry to have their own hood with an updated condenser system that delivers chilled water back through a separate gravity-fed drain system--saving 150,000 gallons of water per year. Kurt has moved his lab three times in the past few years with all the renovating, but of course, is already seeing the extensive benefits to student research.

Since 1995, Yale has made a big push to provide more opportunities for women, minority, economically underprivileged, and other historically underrepresented students in STEM through their STARS Program. Zilm has seen the impact of this program on the science community, and the stats reveal that students who participate in this program continue on in the sciences with a significant impact.

Kurt's own research is on the cusp of exciting results that he will be publishing in the near future. For one project, he's been collaborating with a team at Dartmouth trying to figure out what it is that makes infectious prions infectious and how to differentiate them from non-infectious prions.

He's also been working with a team at Yale's Medical School to understand the molecular mechanism of Alzheimer's Disease--which he thinks they now understand, and have drugs that seem to work with mice.

These research projects have been 90% of Kurt's work over the past five years, and it's all finally starting to bear some fruit. He is quick to talk about the importance of collaboration:

"These projects are really starting to bear fruit only because we're collaborating with these two teams, and we have the right people and the right facilities to work on this. None of us could have done it on our own."

For Zilm, it's all connected: from the similar molecular origins of his two projects, to the investment in students and facilities, to his beginnings at the University of Utah, and the collaborations he's been part of in the past, present, and future.

"None of us could have done it on our own."

BA 1977

Bill Jack

Senior Scientist
New England Biolabs

Bill Jack's undergraduate experience at the University of Utah's Chemistry Department was foundational and flavored his graduate school and professional path. In hindsight, Bill also recognizes the influence of the few humanities courses he participated in where discussions on James Joyce and American Literature altered his perspective on the world. His only regret about his undergraduate years here at the U, is that he did not slow down and take advantage of broader educational opportunities to learn as much as he could in both the humanities as well as in chemistry.

During one undergraduate summer, Bill was inspired by a single sentence in a physics course that would influence the way he approached the world. The instructor, Dr. Swaggart, began his class by telling the students, "I'm going to teach you about a new way to look at the world." Bill integrated this sentiment in a variety of different subjects since then, whether in math, social studies, literature, chemistry, anything really. "It's a different way to see the world, and that broad background just increases your appreciation of the world," says Bill.

Bill's educational foundation led him to a graduate program at Duke University where he thought he would begin a career as a physical biochemist after "tailing" Sidney Velick all summer, but, in an effort to simplify his newlywed life, he asked to work in a lab which quickly altered his path. He ended up being a graduate student with Paul Modrich researching an enzyme that ended up being one of the enzymes that is foundational at New England Biolabs--the only "real" job he's ever had after he completed his graduate and postdoc work.

Bill has been working at NEB for the past 31 years, and now enjoys the freedom to take risks in his research. He confirms that the company's founder is absolutely right when he claims that, "New England Biolabs scientists can't wait to get to work each morning to see how their experiments turned out." Bill's latest project is admittedly risky, but that's what makes it so exciting. The possibility that something might work as he tries to wrap his mind around different ways of analyzing and changing the environment to find a solution for such a fascinating biological phenomena keeps him pushing new boundaries.

Bill is collaborating with a team at Columbia University with an expertise in the biology of the DNA sequence he's investigating. They're growing, breaking, and piecing back together the sequences to try to replicate in a test tube the DNA splicing that happens naturally. "I believe that there will be steps along the way that we will have insights into other organisms, other processes whether they be normal ones or ones that cause disease, and there's also even prospects from a commercial perspective that some of the enzymes involved will be useful in advancing other molecular biology techniques. The company I work for takes enzymes that occur in nature, pulls them out, and characterizes them so they're available in other workflows to prepare DNA sequences."

"It all just fit together. I don't think I could have orchestrated it better myself."

2019 Distinguished Alumni Awards Dinner & Ragsdale Scholars

The dominant themes of the events and gatherings surrounding our distinguished alumni were community, connection, and values. Bill Jack, Kurt Zilm, and Michelle Williams all had fond and inspirings stories to recount about their time here at the University of Utah.

As they wandered the halls of the "old" chemistry building, they noticed things that were definitely still the same, but were excited about all that is new since their time here. Not only have the green tiles in the Henry Eyring Building stood the test of time, but so have the relationships and the education these three took with them throughout their careers.

Their journeys embody the standard of excellence the Chemistry Department at the University of Utah strives to instill in all of its students and faculty.

As each of them spoke briefly and powerfully at the dinner, they reminded all of the guests how personal educational opportunities are foundational for exceptional career possibilities.

Kurt Zilm told stories about the easy and frequent access he had to Professor Ted Eyring, and his generosity of knowledge and time. It's no wonder Zilm is heavily involved with undergraduate students at Yale University.

Michelle Williams spoke about the Chemistry Department's dedication to helping girls become women in a field that can still be difficult to break barriers and stereotypes. She was given a community and an experience that allowed her to bind her passions of people and chemistry--the essence of her position as Global Group President at Arkema.

And Bill Jack inspired all in attendance as he repeated what he learned in an undergraduate course here at the U: how to look at the world in a new way. Again and again, he applies this to his research at New England Biolabs, a company that fosters and believes in beautiful and ethical research to lead to more sustainable solutions.

Kurt Zilm Seminar: The Many Phases of Prion Protein As Observed by NMR

Nuclear magnetic resonance has proven invaluable in characterizing all sorts of functionally important macromolecular aggregates from amyloids to membrane-less organelles. In this talk I will describe the discovery and characterization by NMR of multiple phase states of prion protein[1] (PrP) with relevance to Alzheimer's disease (AD) and prion infectivity. The binding of amyloid-beta oligomers (Aβo) to PrP has been demonstrated to lead to synapse loss and the onset of symptoms in an animal model of AD. Biophysical investigation of the mode of PrP /Aβo association found formation of a stoichiometric complex, which was subsequently shown by magic angle spinning (MAS) NMR to be a hydrogel phase. In this phase we find liquid-like mobility for PrP in the hydrogel, while the Aβo instead behave as a rigid molecular solid.

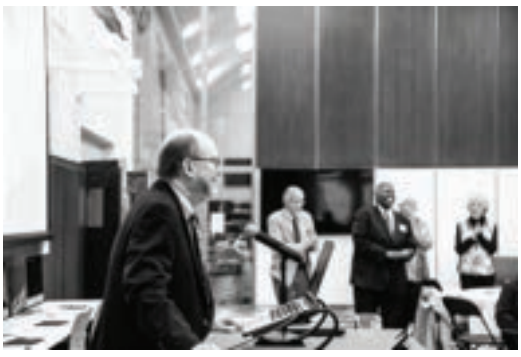
Association of PrP to Aβo is mediated via lysine clusters, which can be detected by observation of large differential mobility between bound and unbound lysines by ^{15}N MAS NMR. Exploration of the PrP /Aβo phase space has further led to discovery of a PrP rich viscous liquid phase. Each of these distinct phases is accompanied by specific changes in PrP secondary structure. I will discuss how these findings are proving relevant to development of possible treatments for AD. Compounds that disrupt the hydrogel phase have been shown to relieve memory deficits in AD mice, and make it possible to detect the selective dissolution of the hydrogel phase in Alzheimer's brain lysates. These same studies are also proving relevant to explaining the requirement for the presence of anionic co-factors in preparation of synthetic infectious prions, and point to plausible molecular sources for the observation of distinct prion strains.

[1]Kostylev et al, Mol. Cell, 2018 Nov 1; 72(3) 426-443

Bill Jack Seminar: DNA Polymerase Activity With Modified Nucleotides and Templates

The central biological role of DNA polymerases is to copy DNA in a complete and accurate manner, allowing transmission of the encoded genetic information. These polymerases have also been exploited in molecular biology applications to incorporate modified nucleotides, a usage which can be at odds with the inherent fidelity of the enzyme. My lab has analyzed the kinetics of incorporation of alternative nucleotides to better understand native nucleotide discrimination, and to develop molecular biology tools that better incorporate modified nucleotides.

Numerous studies have analyzed the impact of DNA polymerases on encountering template damage during replication. A related, but little studied issue is replication on modified templates, for example the glucosylated hydroxymethylcytidine (ghmC) genome of T4 phage. It is well accepted that at least one function of these modifications is to block host restriction of the modified DNA substrate. We are currently exploring whether replicative polymerases encoded by phages with modified genomes are adapted to copy the modified template.



Alumni Updates

Tanner Coleman
PhD, OMS IV

Tanner was accepted to Rocky Vista University School of Osteopathic Medicine in July of 2015. Upon acceptance, he was granted the HPSP scholarship with the US Army. He will graduate from medical school this May, and will be attending his residency training at Tripler Army Medical Center in Honolulu, HI in the field of radiology in June.

Adam Curfew
BS

In 2018, Adam was named Co-Chief Operating Officer for the Wasatch and Squatters Brewery. He has worked at the brewery for the past 19 years as brewing was the sole reason he decided to pursue a chemistry degree. Once he received his degree, he was quickly promoted to Director of Production. He held that position for three years until he was made Co-C.O.O. in May of 2018.

Lawrence Nathan
PhD

Lawrence is enjoying 16 years of retirement in El Dorado Hills, CA. He taught chemistry at Santa Clara University from 1970 - 2003. He has enjoyed a bit of travel, lots of golf, and some free tutoring of high school chemistry teachers.

Robert J. Hargrove
PhD

Bob was Peter Stang's first student. When he arrived to work with Professor Stang, his first task was to unpack boxes and help set up the lab. After graduating from the University of Utah, Bob was persistant in his drive to find a position at a small college as a professor. He had sent out about 1,100 application letters before he received his PhD at the U. He started out with a visiting position at Dickinson College in 1974 teaching organic chemistry to undergraduates. The following year, he started a tenure track at Mercer where he is to this day. Bob continues to encourage students to pursue career goals even if they seem impossible. There is always a way. He wishes all the graduates "fair winds and following seas."

Joe Perry
.....
JJ Perry

Joe Perry : JJ Perry (nom de plume)
BA, MD

Joe graduated with a BA in Chemistry in 1972, the year he entered medical school at the U of U. He worked in biochemistry before and after graduation until medical school was too demanding. He practiced cardiology in Salt Lake City until 2003, at which time he began a second career in writing novels while practicing much less in neighboring states. In REAP 23, he used his chemistry and physics background heavily in this science fiction epic. In his novel to be published in 2020, Malady of Man, there is also a great deal of science, mostly biology and anthropology. Dr. Perry says his education at the U provided a solid foundation for both practicing medicine and writing, as most of his novels revolve around either medicine or science.

Alyssia
Lambert
Snow

Alyssia Lambert Snow
PhD

Recently granted tenure teaching chemistry at Pierce College in Washington state.
Congratulations, Alyssia!

In Review
Spring 2019 Seminars

Squire J. Booker, Penn State
JoAnne Stubbe, MIT

Ryan Stowe, Michigan State University
"Moving Beyond 'Critical Thinking': Supporting and Assessing 3-Dimensional Learning in High School and College"

Resa Kelly, San Jose State University
"Exploring how students make sense of conflicting animations of the submicroscopic level of a precipitation reacion"

Jessica Swanson, University of Utah
"Reframing Multistep Kinetic Mechanisms in Biology: A Case Study on Cl^-/H Exchange in CIC Antiporters"

Ayse Asatekin, Tufts University
"Next generation membranes through polymer self-assembly"

Mu-Hyun Baik, KAIST
"Computer Assisted Design of New Catalytic Reactions: Catalytic Borylation of Methane and Other Reactions"

Steven Malcolmson, Duke University
"New Strategies for the Catalytic Enantioselective Synthesis of Chiral Amines and Other Challenging Scaffolds"

Abraham Badu-Tawiah, Ohio State University
"Panoptic Mass Spectrometry: How and Why?"

Joel Harris, University of Utah
2019 Distinguished Faculty Colloquium
"Spectroscopy through the Microscope: Chemical Analysis at Liquid/Solid Interfaces"

John Hartwig, UC-Berkeley
"Selective, Catalytic Functionalization of C-H Bonds with Small and Large Catalysts"

Amanda Hargrove, Duke University, NC
"Deciphering patterns in selective small molecule:RNA interactions"

Steve Sibener from University of Chicago
"Gas-Surface Scattering: Ice, Isotopes, and Interfacial Chemical Dynamics via Visualization"

Federico Rabuffetti, Wayne State University
"Synthesis, Crystal-Chemistry, and Reactivity of Bimetallic Fluoroacetates: From Serendipity to a New Family of Organic-Inorganic Hybrids"

Chris Mundy, Pacific Northwest National Laboratory
"The Initial Stages of Nucleation of $CaCO_3$ Revisited"

Abraham Badu-Tawiah, Ohio State University
"Panoptic Mass Spectrometry: How and Why?"

Steve Sibener from U Chicago
"Gas-Surface Scattering: Ice, Isotopes, and Interfacial Chemical Dynamics via Visualization"

Chris Mundy, Pacific Northwest National Laboratory
"The Initial Stages of Nucleation of CaCO3 Revisited"

Karen Goldberg, UPenn, Parry Lecture
"Molecular Oxygen as a Reagent in Late Transition Metal Organometallic Chemistry"

Nathan Jui, Emory
"Radical Reactions for Control Freaks: New Synthetic Methods Involving Aryl Radicals and Strong C-F Bonds"

JoAnne Stubbe, MIT, Henry Eyring Lecture
"Radicals: Your life is in their hands"

Squire J. Booker, Penn State, Bryant A. Miner Lecture
"Moving Beyond Methionine Synthase: New Insights Into Cobalamin-Dependent Methyltransferase Reactions"

Jessica Hoover, West Virginia
"Catalytic Oxidative Decarboxylative Coupling Reactions: Development and Mechanistic Insights"

Susan Odom, University of Kentucky
"Organic Molecules as Charge-Storing Materials for Redox Flow Batteries"

Steve Whitelam, Molecular Foundry, Lawrence Berkeley National Laboratory
"Growth and self-assembly processes 'far' from equilibrium"

Michele Coote, Australian National University
"Catalyzing and Controlling Chemical Reactions with Electric Fields"

Brett VanVeller, Iowa State University
"Surfing the excited state energy surface towards new applications in photochemistry and biomedicine"

Michael Van Stipdonk, Duquesne University
"Using the Ion Trap as a Reaction Vessel AND Sample Cuvette for Chemical and Structural Studies of Uranium Species"

Adam Urbach, Trinity University
"Sequence-Predictive Recognition of Peptides and Proteins"

Gunther Andersson, Flinders University
"Electronic Structure of Titania Surfaces Modified by Metal Clusters and Application in Photocatalysis"

Kurt Zilm, Yale University, Distinguished Alumnus
"The Many Phases of Prion Protein as Observed by NMR"

Bill Jack, New England Biolabs, Distinguished Alumnus
"DNA Polymerase Activity with Modified Nucleotides and Templates"

Tom Wenzel, Bates College
"Active Learning: Why it's justified. How to implement it"

Ben Rogers, Brandeis University
"Characterizing dynamic pathways in colloidal self-assembly"

James Frederich, Florida State
"Exploiting Natural Products to Design Protein-Protein Interaction (PPI) Stabilizers"

Jim Mayer, Yale
"Proton-Coupled Electron Transfer in Molecular Electrocatalysis of Oxygen Reduction and in Interfacial Reactivity"

Maryam Ghiasse
3rd-Year Grad Student

Dr. Peter Armentrout

Marisa Asadian
Undergrad Senior

The Future of Chemistry

Marisa Asadian
Senior, Class of 2020

Marisa was born in Iran near the Caspian Sea, and, as a child, her mother gave her books filled with images of the galaxy and stars in an attempt to satisfy her insatiable hunger for learning about the world. Marisa's passion for growth and learning is as infinite as it gets. After becoming bored as a medical assistant, Marisa decided it was time to begin a college degree and moved back "home" to Utah where her family had lived previously to attend the University of Utah.

She thought she'd eventually find her way to medical school, but fell in love with chemistry along the path. Why chemistry? "Because chemistry is everything!" She's passionate about the interdisciplinary role of chemistry and how it "interferes" with her other loves of physics and biology. Marisa joined Dr. Peter Armentrout's research group where her project is on a lanthanide metal ion known as dysprosium cation to establish periodic trends, electronic structure studies, and to get a fundamental understanding of metal bonding characteristics such as bond energies of dysprosium cation containing molecules.

Marisa cares deeply about the environment, and wants to make a significant impact on discovering catalysts for new energy storage and sustainable fuel sources. She has been accepted to study microbial electrochemistry and biological fuel cells at Braunschweig University of Technology this summer. Marisa is looking forward to the entire experience and says, "I'm excited to grow. I know when I come back, I'm not going to be the same person."

Most of all, Marisa feels it's most valuable that, here at the University of Utah, she has "learned how to learn. I've learned how to discipline myself. I've learned a lot about the resources here at the university, and have had so many opportunities in the Chemistry Department." Don't be surprised if you see Marisa as Dean of the College of Science one day. She knows what she wants, and she'll find a way.

Bryan Banuelos
Freshman, Class of 2022

It's always impressive when a student earns a scholarship--the dedication, focus, and all-around excellence is inspiring. Not only is Bryan Banuelos a hard-working recipient of scholarships at the U, but, as a freshman, he has already found grant money that he immediately put towards a scholarship fund at his high school for undocumented students. Originally from Mexico, he is eager to give back after all the doors that have opened for him--especially here at the U's Chemistry Department.

Bryan is already working as a lab assistant in Dr. Ming Hammond's lab in the Crocker Science Center where he has been welcomed, mentored, and supported. He's able to meet with Dr. Hammond to ask about specific questions in the lab, or anything concerning his future career as a chemist. He's also been working with a graduate student who is a recent transplant from UC Berkeley. Thanks to Hammond's research group, Bryan has high expectations about what kind of people he'd like to work with in labs in the future.

Before coming to the U to study Chemistry, Bryan had been studying chemistry for three years both in Mexico as well as in Utah. Since he was a kid, he has always been curious about the world and how it works. He often found himself reading science books and watching videos on the internet to help him understand more. He struggled in AP Chemistry, but continued on in the subject at the U. After his first year here, he's finding clarity and opportunities to pursue his passions in chemistry. Bryan sees himself studying genetics and earning a PhD.

Hector Torres (right)
Senior, Class of 2020
Pictured with Professor Ryan DeLuca (left)

Hector Torres started his educational and career path headed towards pharmacy. He took some chemistry courses before applying and getting accepted into a pharmacy program. Sadly, Hector's father passed away which led to Hector withdrawing from the program as he reoriented his path. He found himself back at the University of Utah in the chemistry department where he stumbled upon his calling in life: teaching.

Though it had been a few years since he had taken any chemistry courses, Hector thought he could jump right back in and signed up for O-Chem II. He quickly realized that he had lost a lot of what he had learned all those years back, and found himself thinking, "I'm going to fail unless I do something crazy." That something crazy was a simple conversation with Professor Holly Sebahar where he asked for help. She lent him a book and connected him to a tutor with whom he met with daily until he felt confident in O-Chem I principles. He ended up with an A in the class.

Why does Hector want to continue on to a chemical education graduate program? Because "all the O-Chem teachers are amazing." When the department academic advisors saw how much Hector was TA-ing, they encouraged him to pursue teaching. Not only does Hector enjoy helping other students understand their coursework, but he wants to see more diversity in classrooms. As a Latino student, Hector is often one of a few in classes with hundreds of students. He wants to be part of changing that, and is inspired by faculty who draw diversity to their classrooms.

Churchill Scholar

Cameron Owen

Cameron Owen of Boise, Idaho, a senior majoring in chemistry and physics and minoring in mathematics, has received the prestigious Churchill Scholarship to study at the University of Cambridge in the United Kingdom. He is one of only 15 students nationally to receive the award this year and is the fourth consecutive Churchill Scholar from the U.

"Cameron's achievement is a testament to his scientific curiosity and diligence in his undergraduate research," said Dan Reed, senior vice president for Academic Affairs. "A fourth Churchill Scholarship award in as many years demonstrates the value of undergraduate research and mentorship experiences at the U, and that our students are among the best and brightest in the world."

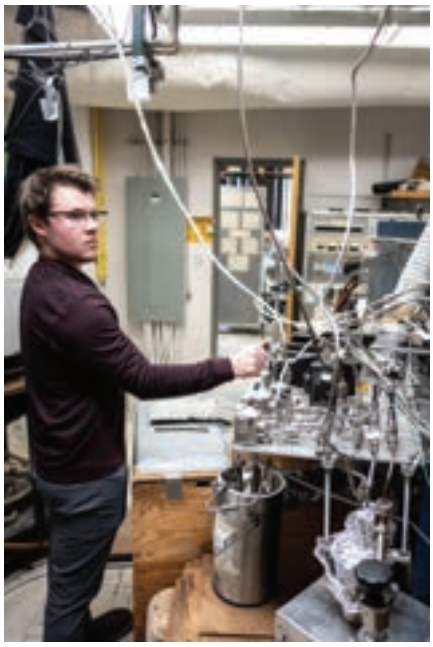
The Churchill Scholarship, established in 1963 at the request of Winston Churchill, provides undergraduates with outstanding academic achievement in the science, technology, engineering and math fields the opportunity to complete a one-year master's program at the University of Cambridge. Students go through a rigorous endorsement process in order to apply, but only after their home institution has been vetted with the Churchill Foundation. The U was added to the foundation in 2014.

Owen, a recipient of a 2018 Barry Goldwater Scholarship, came out of high school with an interest in chemistry. He joined the lab of Peter Armentrout, Distinguished Professor of Chemistry, after hearing about Armentrout's research in his honors science cohort.

While at the U, Owen has published his research and traveled twice to the Netherlands as part of the National Science Foundation Research Experience for Undergraduates program.

Owen and Armentrout, in an ongoing collaborative effort with the Air Force Research Laboratory, are currently studying the activation of methane by metal atoms, particularly gold, in the gas phase. Methane activation, the process of breaking the carbon-hydrogen bond of methane, and subsequent functionalization could eventually be used to convert the enormous amounts of methane from natural and shale gas feedstocks into usable products like methanol or ethane. "I want the activation of methane into liquid fuels and other viable products to be environmentally beneficial and economically advantageous," Owen said. "Current processes that activate methane are exorbitant in both time and energy."

At Cambridge, Owen will explore how methane chemically attaches to the surfaces of certain metals. "My project will be purely theoretical," he said. "But I'll be able to apply what I've learned about certain metals that react with methane in the gas phase to potential catalysts of the future. You can extend those results to better understand the activation of other greenhouse gases in order to create more effective real-world catalysts."



Henry White
John A. Widtsoe Presidential Endowed Chair in Chemistry

President Watkins appointed Henry S. White as the holder of the John A. Widtsoe Presidential Endowed Chair in Chemistry, effective July 1, 2019. This chair was recently held by our now emeritus colleague Dale Poulter. Henry has had an extraordinary career here for the past 25+ years. He essentially invented the area of nano-electrochemistry with groundbreaking work in ultramicro-electrodes, electroactive films, glass nanopores and nanobubbles. A hallmark of his work is a "deep conceptual understanding coupled with exquisite experimental design," according to outside experts in his field. Henry will soon complete 11 years of service to the Department and College as chair and dean, a time during which enormous growth in facilities has taken place as well as very strong growth in the quality of research and education.

Save the Date

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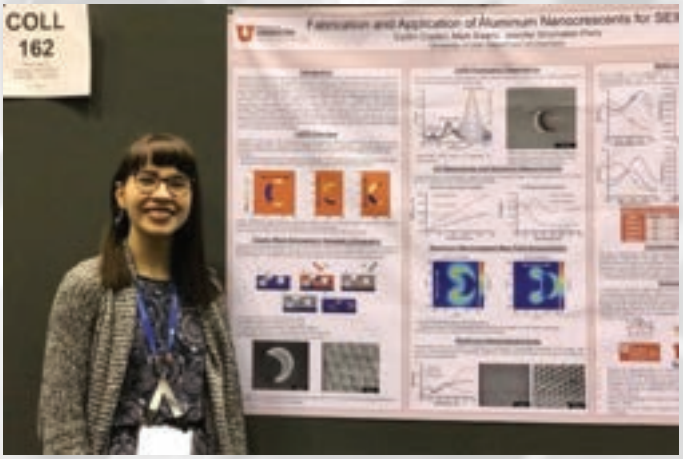
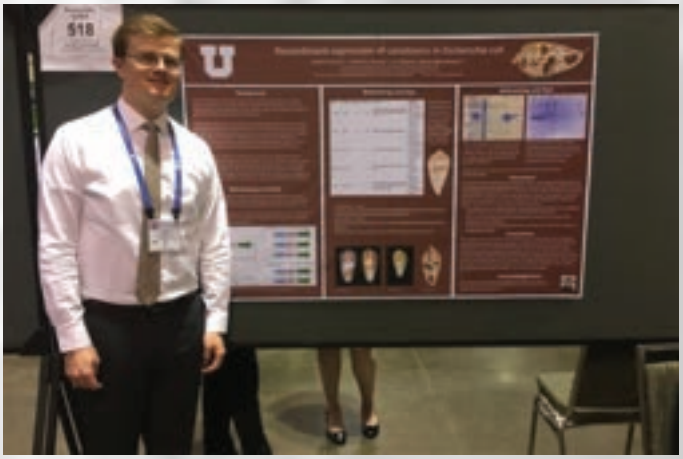


Caitlin Coplin won an award for her poster for her research with Prof. Jennifer Shumaker-Parry.



Paul Baskin presenting his research on Recombinant expression of conotoxins in Escherichia coli.