Dr. Matthew Cordes turns knowledge of brown recluse spider venom into new treatments.
Dear Alumni and Friends of the Department

CBC@UA!

E are looking forward to an exciting year ahead for the faculty, students, and staff in the Department of Chemistry & Biochemistry. Our big event this fall is the CBC Then & Now Alumni Reunion being held November 14-16, 2013. We have nearly 40 alumni who graduated between 1960-1975 coming back to see how the UA and the Old Pueblo have grown over the last ~50 years. Watch for the next CBC Then & Now Reunion scheduled for the fall of 2015.

It has been a turn-around year in CBC for extramural funding! Since July 2013, CBC faculty and staff received new grant awards of $8.3M from the NIH, NSF, EPA, and the ACS. The largest new grant is headed by Regents’ Professor Jeanne Pemberton, who received a $4.4M grant from the NSF and EPA to develop a new class of environmentally safe glycolipid-based surfactants. We expect to see more of the same as 30 new grant proposals were submitted by CBC faculty between September and November, which is a record number for fall application deadlines. The CBC business office is headed by Kriss Pope, with Amy Tary as the team lead on grants and contracts. Good job everyone!

No doubt our CBC faculty are some of the best and brightest at UA (and beyond!) in research, teaching, and outreach.Neal Armstrong was named a University of Arizona Regents’ Professor, the highest rank given to a UA faculty member. Another is Michael Brown who was elected an AAAS Fellow and also awarded the Biophysical Society’s Avanti Lipid award. Congratulations go out to Jeanne Pemberton for being named a 2013 Galileo Circle Fellow by the UA College of Science, Vicente Talarquer, recipient of the College of Science Distinguished Achievement in Science Education award, and Andrei Sanov for receiving the College of Science Innovation in Teaching award.

CBC students have also scored some big awards. Eric Hansen, a Chemistry undergraduate major, was awarded a prestigious Goldwater Scholarship for his academic achievements in science, and also named the 2013 Astronaut Scholarship by the Astronaut Scholarship Foundation. CBC graduate students who took top honors were Katherine Leight (NSF Graduate Research Fellowship), Stephanie Tolbert (American Association of University Women award), and Jared Greibel (UA Student Innovator of the Year award). These outstanding students are but a few of the 750 undergraduates and 180 PhD students currently earning degrees in Biochemistry or Chemistry.

With two ongoing faculty searches this year, one at the senior level in the area of biomedical mass spectrometry, and the other at the junior level in either inorganic or organic chemistry, we continue to invest our time and energy in building the department’s future. We invite you to join us in these efforts by helping support CBC@UA! with your tax-deductible donation today.

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Send your news to Olivia at omendoza@email.arizona.edu to be included in next year’s magazine!

Vic Thalacker PhD 1968
Retired from 3M, now volunteering on Habitat for Humanity builds and water projects in Tanzania.

Greg Miller PhD 1973
President of the American Association for Clinical Chemistry in 2012.

Dan Perez BS 1978
Managing the Public Health Chemistry group, the primary EPA laboratory in Arizona.

Tomi Sawyer PhD 1981
Hoping to become a professor after 32 years in biotech.

Matthew Austin BS 1985
Moved from dyes to working in compliance for the Huntsman Corp. Advanced Materials division.

Kelly LeFevre Atkinson BS, BA 1999; MS 2002
Managing genomics, proteomics, metabolomics, and bioinformatics facilities at University of Auckland.

Emily Dykstra BS 2002, MS 2004
The Assistant Lab Director for the first semester introductory biology labs at the UA.

Jennifer Himes BS 2005
Lead Quality Systems IT Coordinator for Celgene.

Amanda Wendt BS 2005, MS 2006
Pursuing a PhD in Nutrition and Health Sciences at Emory University.

Leo Bartik BS 2006
Doing an Anesthesiology residency at Johns Hopkins University School of Medicine.

Karen Rachel Hayes BS 2006; MS 2007
Had a baby, Gretchen, in August 2012.

Chandana Sharma PhD 2006
Working at SAFC, part of Sigma-Aldrich.

Wendy Ingram BS 2007
Pursuing a PhD in Molecular and Cell Biology at the University of California, Berkeley.

Van Duong BS 2008
Working at Regeneron Pharmaceuticals ensuring compliance with the FDA.

Ellene Mashalidis BS 2008
A postdoctoral research associate at Duke University.

Abbas Tuli BS 2008
In a residency at the University of Virginia in the Department of Internal Medicine.

Brian Bode BS 2009
Traveling the world and studying for an MD at University of Szeged in southern Hungary.
Alumni News, cont.

David Durazo BS 2009

Alice Ferng BS 2009
Pursuing an MD-PhD degree at the UA College of Medicine in Tucson.

Erin Acino Brettmann BS 2010
Majored a fellow graduate student in the Biochemistry program at Washington University in St. Louis.

Joseph Farmer BS 2010
Teaching chemistry, AP chemistry and coaching the men’s swim team at Rincon High School in Tucson.

Jennifer (Heck) Hollinger BS 2010
Currently on an away rotation at Stanford University in Pediatric Genetics.

Alberto Rascon PhD 2010
Assistant Professor of Biochemistry in the Chemistry Department at San Jose State University.

Christian Roessler PhD 2010
A Structural Biology postdoctoral researcher at the DoE’s Brookhaven National Laboratory.

Kimberly Yang BS 2010
A third-year student at the University of Arizona College of Medicine – Phoenix.

Jennifer Collins BS 2011
Studying epidemiology at the UA Mel and Enid Zuckerman College of Public Health.

Tara Hill BS 2011
At the University of Arizona working towards an MA in Special Education.

Beryl Jones BS 2011
In the graduate program in Evolutionary Biology at the University of Illinois, Urbana-Champaign.

Mounir Kousa BS 2011
Working towards a PhD in Neuroscience at Harvard.

Itzel Rojas BS 2011
Studying in the Program for Experimental and Molecular Medicine (PEMM) at Dartmouth College.

Kristen Sanders BS 2011
Studying medicinal chemistry at Northwestern University and aspiring to teach.

Jose Techner BS 2011
In a dual MD-PhD Northwestern University Medical Scientist Training Program, and a PhD program in Chemistry.

Aeen Asghar BS 2012
At the University of Iowa Carver College of Medicine.

Kristin Bratton BS 2012
Pursuing an MPH at the Emory University Rollins School of Public Health and working at the CDC.

Aubri Carman BS 2012
At the UA College of Medicine, and completed a travel fellowship to a pediatric HIV clinic in Zambia.

Troy Comi BS 2012
Pursuing a PhD in Chemistry at the University of Illinois, Urbana.

Diana De La Torre BS 2012
In the PhD program in Pharmacology and Toxicology at the University of Texas at Austin.

Judith Jenkins PhD 2012
Pursuing postdoctoral research for solar energy conversion platforms with Professor Scott Saavedra.

Rodrigo Lopez BS 2012
Working as a process design engineer for Exxon-Mobil in Beaumont, Texas.

Xin Ma MS 2012
Completing a PhD at Ohio State University.

Tarik Ozumerzifon BS 2012
Working towards a PhD at Colorado State University in Fort Collins.

Liana Tsirklin BS 2012
In a dual Master’s program in Exercise Physiology and Nutritional Sciences at San Diego State.

Tyler Chozinski BS 2013
A first year Chemistry graduate student at the University Washington, Seattle.

Melissa Gifford BS 2013
Working as a Process Engineer at W. L. Gore & Associates.

Kara Smith BS 2013
Attending the Naval Nuclear Power School as a US Navy Nuclear Submarine Officer.

Lauren Wugalter BS 2013
Working in a research lab at the University of Washington in preparation for the PhD program.

Online Extras: Click on alumni names in the online PDF for full stories!

cbc.arizona.edu/alumni_friends
In August 1985, I arrived at the University of Arizona, hoping interesting and exciting things would happen both on campus and at the intersection of chemistry and biology. Now that I look back 28 years later, I'm amazed how well those hopes were realized. I'm also surprised at how much UA continues to contribute to my work life as a researcher at the Tucson Innovation Center of Sanofi Pharmaceuticals.

I'm probably not the only freshman who arrived excited about science (thanks, Carl Sagan!) but unsure how to connect material from class into anything outside the classroom. Biology 181, taught by Dr. Bill Grimes, was a revelation. We didn't just learn about the cell—we learned how those parts of the cells related to the newly discovered HIV, eventually leading to the headline-grabbing disease of AIDS. Dr. Grimes' demonstration of the application of chemistry and biology to impact people's lives continues to inspire.

As you may expect, another milestone for me was working in a real lab for the first time. In my case, I was incredibly fortunate to be able to work in the lab of Dr. Michael Wells as part of the Undergraduate Biology Research Program, which he founded by Teri Suzuki, PhD | PhD in Biochemistry, 1998

If asked what might be surprising to folks who knew me before I started working at Selectide, I would definitely say it would be that I now play pick-up soccer. No one, including me, would have predicted that. The game I joined has a core of Selectide/Sanofi folks, plus others from the neighborhood. It has been running for 20 years and some players now have their kids playing in this game too. What drew me in was the relaxed, fun-loving spirit of the players. Since it is such a good natured game, and all skill levels are welcome, it's become my favorite form of exercise and I'm now playing twice a week.

I very much enjoy. The Tucson Innovation Center benefits from great collaborators in the United States and Europe, including Arizona-based groups such as the Muscular Dystrophy Association and organizations affiliated with UA. Helping to establish collaborations with excellent outside groups is another aspect of my job that I very much enjoy.

Earlier this month I heard a colleague give a talk explaining how an understanding of the molecular structure of viruses may make it possible to create vaccines against viruses where it has previously been impossible. If Dr. Grimes had been in the audience, I think he would have approved.

Evan Hersh. It was acquired by Marion Merrill Dow (MMD) in 1995. Hoechst Pharmaceuticals purchased MMD and was subsequently acquired by Sanofi. Sanofi is a global healthcare company with more than 100,000 employees and includes companies such as the vaccine company Sanofi Pasteur and Genzyme, which has expertise in rare and genetic diseases.

The Tucson Innovation Center has remained a part of these global companies because it has been successful at finding small molecules that have potential in the battle against human disease. As a lead research investigator, I routinely work with gifted chemists and biologists on projects designed to find these small molecules. A large part of our success is the very strong connection between the chemists and biologists at our site, and it is also one of the great parts of my job.

The Tucson Innovation Center benefits from great collaborators in the United States and Europe, including Arizona-based groups such as the Muscular Dystrophy Association and organizations affiliated with UA. Helping to establish collaborations with excellent outside groups is another aspect of my job I very much enjoy.

We published a paper this year describing the first chemical step in the process that leads to necrotic skin lesions resulting from the bites of brown recluse and related spiders.

It was one of the most rewarding discoveries of my scientific career, but not one I ever dreamed I’d be involved in. Certainly not back when I was in graduate school doing mechanistic physical organic chemistry, and not even when I was a postdoctoral fellow studying the origin and evolution of new protein structures.

When I arrived at the University of Arizona as an Assistant Professor in 2001, I thought of myself as a protein biochemist with an interest in molecular evolution—spider venom was nowhere on my radar.

But one day during my first year on the Biochemistry faculty, while wandering the hallways of Biosciences West, I struck up a conversation with Greta Binford, a postdoc working in the lab of the late Mike Wells. Greta had worked on spider biology for her PhD, and was now doing a stint in Mike’s lab to look at some unusual proteins in brown spider venom.

Greta was (and is) one of those scientists whose enthusiasm is infectious, and she made me curious. Being focused on evolutionary questions, I started to wonder where these proteins came from and how they became toxins in spider venom.

In 2003, Greta moved on to a professorship at Lewis and Clark College, but we kept in touch and eventually published a paper together in 2005. We found that the brown spider venom toxins had evolved from a harmless housekeeping protein common to essentially every organism. We also discovered that the gene for the toxin had been transferred between spiders and pathogenic bacteria. We made these discoveries without doing a single experiment, but rather by cobbling together information from public databases. You have to love bioinformatics!

Still, the collaboration with Greta was a side interest for me, until a young graduate student named Dan Lajoie came along in 2009. Dan was just burning to do experiments on these spider venom proteins, and he doesn’t take no for an answer. Sometimes that’s what it takes—stubborn determination. There’s nothing like the motivation of a truly interested and curious student. Soon afterward, Vahe Bandarian, an Associate Professor in the Biochemistry department and an expert enzymologist, joined the team, and we were off to the races.

Even then, we could not see the road ahead, and Dan was soon to make a completely surprising discovery. He was trying to develop a phosphorus NMR experiment to look directly at what these proteins were doing. But it didn’t seem to be working. Everyone who worked in this field (including us) knew for sure that the protein made a certain product, but it wasn’t showing up in Dan’s experiment. Something else was. After much discussion, including great advice from my enzymologist father, and (many!) more experiments, we concluded that the venom protein actually didn’t catalyze the reaction everyone thought it did! Instead, it carried out a different reaction to catalyze ring formation in membrane phospholipids. We hope that follow-up experiments will explain how this unusual reaction could set in motion a cascade of events that leads to the bizarre gangrene-like lesions caused by brown spider bites.

For me, there’s nothing more fun about being a basic scientist than heading off into the unknown. Science isn’t just about what you’re trained to do, or set out to do; it’s about curiosity and openness to the unexpected. Spotting what’s wrong with the picture. As with so much else in life, it’s also about people coming together and realizing that they have something in common. You just never know what will come of it!
Building Better Mousetraps

by M. Bonner Denton, PhD | Professor, Chemistry and Biochemistry

They say “build a better mousetrap and the world will beat a path to your door.” Well, we have found that to be at least partially true in our quest to improve the sensitivity of small electronic devices that can be used in military and civilian applications.

It is fair to say that the Departments of Defense (DOD) and Energy (DOE) have been good to the Denton Research Group by providing us with the research funding we have needed to pursue fun science. Starting in 1973, we were funded by the Office of Naval Research (ONR) to explore how a potentially revolutionary technology—small laboratory computers—would impact the chemical laboratory. With strong encouragement from ONR, we explored computer control of another emerging technology—charge coupled device (CCD) and charge injected device (CID) arrays and their potential application to chemical spectroscopy. For years scientists and engineers had searched for a reliable electronic detector capable of simultaneously observing a wide range of wavelengths. Numerous potential technologies had been investigated, however, all previous candidates suffered from limited dynamic range, poor sensitivity, small pixel count, and high cost. Collaborating with scientists in the astronomy community, we were able to develop array detectors that overcame all of the previous limitations. We also quickly realized that to properly apply these devices to the field of spectroscopy, it would require optimized optics. Our combination of custom designed spectrometers with these array detectors revolutionized optical emission spectroscopy. Today virtually all inductively-coupled plasma optical emissions systems are sold with array detector technology directly attributable to our work.

More recently we have been developing the first viable array ion detectors for use with focal plane mass spectrometers such as those used for isotope ratio analysis. Modern infrared array detectors operating beyond the cutoff for silicon (~1100 nm) utilize exotic materials such as InGaAs, PtSe, HgCdTe, etc. which are capable of converting long wavelength photons into hole-electron pairs. The readout is fabricated using silicon integrated circuitry and connected to the infrared sensitive pixels. I thought up the idea of employing an array of metal electrode fingers as ion collectors and connecting them to the low noise circuitry developed for the IR detectors to measure the collected charge. The DOE thought this was a revolutionary concept and provided years of funding resulting in vastly improved devices.

We are also currently funded by the federal government to develop advanced technologies for detection of explosives from great distances. At airports today all of the instrumentation requires either picking up a micro-crystal with a swipe or blowing one off with a puff of air. The only technology that can detect the explosives vapor (smell) deployed at airports today is a dog. A dog can smell a substantial amount of TNT from several feet. We can detect one milligram from over 140 feet away, which is amazing when you think about how much safer this will be than sending a human or animal too close to a suspicious package. Maybe our device could be featured in a sequel to the blockbuster movie “The Hurt Locker.”

People ask me when I am going to retire—my answer is when I quit having fun!
The 2013 CBC Awards Ceremony was held Thursday, May 9, 2013 from 10:30–12:30 pm, at the Student Union Memorial Grand Ballroom. The 150 guests included 2012–2013 graduating students, CBC Ambassadors, faculty, staff and friends of the department coming together and celebrating. The Keynote speaker was Dr. Victor Hruby, Regents’ Professor Emeritus, Chemistry & Biochemistry. The closing remarks were given by Lauren Wugalter, 2012–2013 CBC/Chemistry Outstanding Senior.

The 2014 CBC Awards Commencement Ceremony will be held on Thursday, May 8, 2014 at the Student Union Memorial Ballroom approximately from 10:30–12:30 pm.
Faculty and Staff News

Faculty News
Welcome to our newest Faculty Member, Vanessa Huxter, who received her PhD from the University of Toronto. Her group uses innovative ultrafast spectroscopy and microscopy techniques to answer fundamental questions spanning biology, chemistry and physics. Through these techniques, her group seeks to understand collective interactions in systems organized on the nanoscale.

Neal Armstrong was honored as a UA Regents’ Professor.

Michael Brown was named as an American Association for the Advancement of Science (AAAS) Fellow. He also received the Biophysical Society Avanti Award in Lipids.

René Corrales received the Outstanding Faculty Award by the Honors College. Dr. Corrales was nominated by Honors students for his outstanding contributions to Honors education.

Congratulations to Jon Njardarson in being granted tenure as Associate Professor.

Jeanne Pemberton was named as a College of Science, Galileo Circle Fellow.

Robin Polt received the Donald S. and Merritt Matteson Lectureship in Chemistry.

Andrei Sanov received the Innovation in Teaching Award.

Vicente Talanquer received the Distinguished Achievement in Science Education Award. Vicente was also promoted to Professor.

Marc Tischler received the College of Medicine, Faculty Teaching Award.

Faculty Research
Craig Aspinwall and S. Scott Savaedra “Electrifying” sensors. New diagnostic and sensing platforms derived from analyte responsive biological nanopores.

Matthew Cordes Metamorphic proteins. Proteins can undergo metamorphosis between different types of molecular structure, across eons of evolution or in less than a second.

Vanessa Huxter Energy travel through diamonds with nitrogen-vacancy centers. Optical and electronic properties of flawed diamonds.

Katrina Miranda was awarded a $30,000 grant to design a free online massive open online course (MOOC) chemistry course for Google.

Jeffrey Pyun Plastic from waste sulfur. A new chemical process can transform waste sulfur into a lightweight plastic that may improve batteries for electric cars and other potential uses, including optics.

Oliver Monti New insights into how organic molecules can be used for ultrasmall and ultrafast magnetic storage devices.

Welcome New Staff Members
Olivia Bernal, Accountant Associate - Business Office.
Jane Dugas, Program Coordinator for Seminars.
Martin Marquez II, CBC Undergraduate Academic Advisor.
Jason Parish, Accountant Associate – Business Office.
Sean Davis, Accountant Associate – Business Office.

CBC Wish List
Your generous gifts enable CBC to fund a variety of departmental student activities throughout the academic year, award prestigious undergraduate and graduate scholarships, purchase state-of-the-art equipment for named CBC laboratories, and endow chairs and professorships to attract and retain renowned faculty members. The following areas have been identified as our highest priorities:

• Gifts to the CBC Department Fund to support the May Commencement Ceremony
• Gifts to support Undergraduate and Graduate Student Fellowships and Travel Awards
• Gifts to renovate laboratories in the Marvel Chemistry Building
• Gifts to renovate laboratories in the Biological Sciences West Building
• Endowments to establish CBC Faculty Chairs
• Endowment to establish a CBC special seminar program

cbc.arizona.edu/alumni_friends

In Memorium
People We Lost In 2012–2013
Beverly Patton McAlpine
BS Chemistry, 1949
Lowell Rogers BA Chemistry, 1967
Carol Thielen BS Chemistry, 1977
Glen Wolfe PhD Chemistry, 1968
Student News

Research and Study Abroad Adventures
Jonathan Ferng - Peru
Summer Gardner - Italy
Eric Hansen - Northwestern University
Sophie Hapak - Germany
Alex Harris - Japan
Shaina Hasan - Singapore
Eileen Leaer - Italy
Aileen Leyva - Peru
Burke Lieppman - Harvard Medical School
Estefania Lopez - Costa Rica
Desiree Morris - Brazil
Nickie Seto - Japan

University of Arizona UAN Chapter Hosts its Fourth BECUR Conference
The University of Arizona UAN Chapter hosted the fourth Biochemistry, Engineering, and Chemistry Undergraduate Research Conference (BECUR) on February 23, 2013. Approximately thirty-five UA and Arizona State University students presented posters along with six Tucson area high school students.

We BlastOff Again!
The UA UAN Chapter and Biochemistry Club held its second fun and successful middle school summer science BlastOff camp, from June 10-14. Students from Safford, Dodge, Drachman, and Playa del Rey middle schools participated in a week of scientific exploration and fun during our revised summer camp in which undergraduates served as group leaders and mentors.

Online Extras: Click on names and story titles in the online PDF for full stories!

UA Chemistry Club (SAACS)
The Student Affiliates of the American Chemical Society (SAACS) is an undergraduate organization dedicated to spreading the joys of chemistry to the University of Arizona campus and Tucson community. Comprised of students with majors anywhere from Chemistry to Classics, the group regularly participates in outreach events throughout Tucson. Notable examples include Household Hazardous Waste collection with the Tucson Fire Department, Chemistry Can Be Fun Camp with the Tucson Autism Alliance, and STEM camps with Women in Science and Engineering (WISE) and the Girl Scouts.

Each semester SAACS hosts a free public magic show on the UA campus. These shows are a great way to involve all members in the SAACS experience. Additionally, members are encouraged to network with professors and learn about current scientific research and industry endeavors at weekly meetings. Every spring, the group travels to the American Chemical Society’s National Meeting to accept honorary undergraduate awards for Outstanding/Commendable Chapter and Green Chemistry. If you have any questions or comments for SAACS, please contact saacsaz@gmail.com.

CBC
the Catalyst CBC alumni magazine
department of chemistry and biochemistry | fall 2013
CBC Snapshots

2012 CBC Family Weekend
Ashley Vergara, Elina Ly, Melissa Nguyen, and Audrey Shi

2013 CBC Poster Fair
Stephanie Kha showing her poster

2012 CBC Family Weekend
CBC Ambassadors

2013 CBC at 2013 Festival of Books
Ice Cream servers Laura Lustro, Taylor Synaka, Jennifer Sia, and Desiree Morris

2012 CBC Family Weekend

2013 Mentor Ice Cream Event
Barbara Ibeh and Elina Ly having fun

2013 CBC at 2013 Festival of Books
Kristie Mgbara and Olivia Mendoza chillin’ with Ice cream

2013 Summer Salsa Challenge in the CBC Advising Office

2013 CBC Family Weekend

2013 Mentor Ice Cream Event

CBC Poster Fair
Celestina Mesa and Nicole Eckhoorst, CBC Ambassadors

2013 CBC at 2013 Festival of Books
Chili Master Chefs Michael Williams and Dallas Matz

2013 Summer Salsa Challenge in the CBC Advising Office

2013 BECUR Conference
Harrison Frisk showing his poster

2013 CBC at 2013 Festival of Books
2013 Welcome Back CBC Students, Water Balloon Toss and Ice Cream Social

2013 Summer Salsa Challenge in the CBC Advising Office

The Chemistry Club in Action at the 2013 Festival of Books
Kevin Comert, Kara Saunders, and Manny Vasquez

2013 BECUR Conference

The Chemistry Club in Action at the 2013 Festival of Books

2013 CBC at 2013 Festival of Books
2013 Welcome Back CBC Students, Water Balloon Toss and Ice Cream Social

The Chemistry Club in Action at the 2013 Festival of Books

Martin Marquez, Olivia Mendoza, Cindy Neal, Dr. Roger Miesfeld, and Dr. Kevin Bao
Alumni News

Vic Thalacker PhD 1968
As part of my retired life I’m spending a lot of time in volunteering situations. I work with other 3M retirees on Habitat for Humanity house builds. The group has completed over twenty facilities over the past 8 years. I am also on the board of St Paul Partners, a local, religiously affiliated group that works on water projects in Tanzania. I have been in Tanzania four times and we have developed over 100 wells for the rural areas in the Iringa region of TZ. Right now we are working on developing sustainability projects to keep the wells functioning for longer periods of time. We are also working on partner development with others that have an interest in third world water development.

Greg Miller PhD 1973
President of the American Association for Clinical Chemistry in 2012.

Dan Perez BS 1978
What a great opportunity—I was asked to write about how my Wildcat degree brought me into my very fulfilling job. It prepared me on so many levels that I wasn’t even aware of when I graduated in 1978 from the University of Arizona with a Bachelor of Science degree in chemistry.

I started working with the Arizona Department of Health Services, the State Laboratory, in May of 1980. I worked in the Air lab doing gravimetric and lead analyses. In 1982, I then went into the Volatile Organics Analysis (VOA) program and worked for two years (1982–1984) doing VOA (e.g. TCE, benzene, xylenes, etc.) analyses using a Tekmar LSC-1 and LSC-2 with a Tracor 560 gas chromatograph connected to a Spectra Physics integrator. I wanted to continue to expand my knowledge base and became interested in moving into other programs to increase my expertise. The State laboratory provided me with the options to learn.

Consequently, in 1985, I went into the Solvents Program and worked there for two years (1985–1986) working with a Hewlett Packard 5890 gas chromatogram testing for solvents in water and soils, solvents such as carbon disulfide, acetone, methyl ethyl ketone, and methyl isobutyl ketone. In 1986, I went back into the VOA program for two years (1986–1987). I worked there for two years doing purge and trap analysis with a Tekmar LSC-2 hooked up to a Tracor 565 gas chromatogram with the Maxima chromatography software, one of the first computerized chromatography software system available. I sure was excited about that!

An opportunity then arose to move into the Pesticides Program where the Nelson Analytical System, specifically the 2600—a fore runner to the Turbochrom Chromatography system, was being introduced. In the Pesticides Program I worked with several Tracor 560, 565 and 570 GC’s, a Microtek 220 GC (believe it or not!), and a Clarus by Perkin Elmer. The detectors were electron capture, flame ionization and N/P. It was during this time we converted to Turbochrom for data acquisition / processing. The analytes we worked on included chlorophenoxyn acetic acid herbicides, halocetic acids, organochlorine compounds (e.g. toxaphene, chlordane, endrin, heptachlor, heptachlor epoxide, etc.), dibromoethane (EDB) and dibromochloropropane (DBCP), arachors, carba-
I always expected from the time I was a fledgling graduate student in the fall of 1976 my life in a manner which has been fun, fulfilling, and has served to give me a sense of aspect of chemistry use in the “real” world.

I managed the pesticides laboratory until 1/2006 when I was tasked to do trouble-shooting on Total Kjeldahl Nitrogen (TKN) / Total Phosphorus (TPO4) analyses after difficulties kept occurring during those analyses. The original method used a digestion with mercuric oxide catalyst, the sample was then injected on to a Lachat Flow Injection Analysis (FIA) system. There were problems with the digestion and the FIA which continued over the next year. After working (troubleshooting?) with this system we ultimately decided to convert to a copper sulfite catalyst on the Lachat FIA. This was recommended by EPA to reduce the amount of mercury waste being generated. Method development took place over the course of a year.

Still pesticides manager, I came back to my first love, chromatographic analysis, in 2008. I also began managing the Food Emergency Response Network (FERN). In 2009, I also began working with and developing a variety of methods and instrumentation including a Perkin Elmer ELAN ICP-MS, Dionex IC, Perkin Elmer Clarus and Agilent 5900 GC’s doing a variety of analyses. I am involved with the Preparedness group using an ABI SCIEX 4500 LC/MS/MS for CDC related testing.

I currently manage the Public Health Chemistry group. We are the primary laboratory for the Environmental Protection Agency (EPA) here in Arizona. As the primary laboratory we are responsible for maintaining the capability to test for all the EPA defined primary and secondary contaminants under the Nation Primary Drinking Water Contaminants program. These include organic and inorganic contaminants such as metals, nutrients, and many of the compounds listed above.

Maintaining this capability requires us to participate in proficiency analyses, maintain our instrumentation in a state of readiness, complete all necessary quality control checks, and maintain documentation as required by the various agencies we work with. The analytical skills I first learned at the U of A have served me well all of my life and allowed me a variety of experiences and learning opportunities.

As manager, I am responsible for maintaining documentation of all submitted samples, chain of custody records, entering sample information and results into our laboratory computer system, assigning tasks, analyzing samples, reviewing data, and reporting out the final results.

In retrospect, the studies undertaken at the University of Arizona have helped define my path in a manner which has been fun, fulfilling, and has served to give me a sense of purpose.

Tomi Sawyer PhD 1981
I always expected from the time I was a fledgling graduate student in the fall of 1976 that I would be a professor and follow the footsteps of the extraordinary career of my mentor, now Regent’s Professor Victor J. Hruby. Perhaps it is fair to say that I was “too successful in my drug discovery studies” as I took a different career path after being aggressively recruited to the pharmaceutical industry—with taking the proverbial plunge with the Upjohn Company in the spring of 1981! (and while still writing my dissertation by the way)!

Indeed, time has passed quickly, and today I’ve had 32 years of a extraordinary career in pharmaceuticals. The experience of more than 10 major drug discovery campaigns and being part of companies ranging from 140,000 employees to being the 4th hired at a startup company. Most recently, from my small-molecule drug discovery campaign at Ariad Pharmaceuticals, I’m very pleased with the approval and marketing of Iclusig, an inhibitor of Bcr-Abl and known clinical mutants thereof, which is well poised to be a breakthrough therapy for the treatment of chronic myelogenous leukemia. Concurrently with this news are two macrocyclic peptides from Aileron Therapeutics that will be tested clinically in the near future. Perhaps, unsurprisingly, as life seems to run “full circle”, it is noteworthy to reflect back upon my graduate studies at the University of Arizona. It was here that the superagonist peptide NDP-MSH (Melanotan-1) would become my first drug to be clinically tested and it now marketed (ScenesseTM) in Europe.

As I now reflect on where I’ve been and where I’d like to go, I’m marching toward what I always intended to do—to be a professor, and hopefully, a really good one in terms of leveraging my scientific expertise, drug discovery accomplishments, an entrepreneurial vision for academic-industry interface, professional networking and unwavering passion (the latter being a trademark of my beloved mentor). I’m seeking a top university that will provide a home for my academic pursuit of drug discovery and translational medicine. I think that such is timely nowadays especially with respect to that ever-changing scenario of science, technology and medicine as integration, innovation and impetus have become to be key dynamic forces to create the next generation of drugs for tackling complex diseases. As always, I humbly thank God for the opportunity to be a part of such good works and to give witness to the wondrous mysteries of life.

As a special tribute to Chemistry and Biochemistry, I have nothing but truly memorable and inspiring thoughts of my past roots and current relationships, including being a member of the CBC External Advisory Board. I enjoyed a great visit earlier this year as a CBC Colloquium Seminar speaker and meeting with many graduate students, postdoctoral fellows and faculty members. Good luck and continued success to you all!

Matthew Austin BS 1985
After working several years as an ink-formulator I moved to Long Beach as an assistant laboratory manager at a dye & pigment distributor. Eventually I became manager of the lab, overseeing color matching projects for textiles, aluminum, wood, water, and waxes. I then went to work for an actual textile dyehouse, running a color matching lab of 18 people. The downturn in the local textile industry put me at a career crossroads. Fortunately, I picked up a useful secondary skill in my previous jobs. Management thought that since I was a chemist I would also be a good candidate to deal with the ever increasing regulatory requirements of OSHA’s Hazard Communications Standard. This experience allowed me to land a job at Ciba Specialty Chemicals, a chemical company that was...
Jennifer Himes

Jennifer is currently working as a Lead Quality Systems Information Technology (QSIT) Coordinator for the Celgene Corporation, designing project workflows, managing the transition to GHS standards, as well as ensuring site compliance with EPA’s Hazardous waste regulations. Her job function expanded to include various aspects of Environmental, Health and Safety compliance. She is currently involved in the company’s transition to GHS standards, as well as ensuring site compliance with EPA’s Hazardous waste regulations.

My degree in chemistry is what got me the interview for my first job. From there, my knowledge of chemistry helped me better understand the processes for applying colorants to various substrates. Later, this knowledge enabled me to evaluate chemical hazards in the workplace and for disposal eventually leading to my position in the corporate EHS group. As part of my job I have been able to travel around the US and to several countries in Europe.

Kelly LeFevre Atkinson

I've just finished my first year in my new role at the University of Auckland (my PhD alma mater) as the manager of two core facilities in genomics, proteomics, metabolomics, and bioinformatics. Managing this diverse group lets me really appreciate all of the fabulous science we do. I often think back to my undergraduate days in Chemistry (and my AXE brothers) and my master's work in then-Biochemistry and Molecular Biophysics. Best wishes from New Zealand!

Emily Dykstra

After completing my Biochemistry Masters with Dr. Michael Brown, I was accepted to an AmeriCorps program called NYC Teaching Fellows. I spent three amazing, hectic, and life-changing years teaching sixth grade science in Manhattan while working on a Master’s degree in Secondary Science Education at the City College of New York. Eventually, the lure of my family brought me back to Arizona which was a wonderful thing because I was able to reconnect with an old college friend who eventually became my husband. James and I have been married for a little over 2 years and are expecting our first child in March.

I am currently the Assistant Lab Director for the first semester introductory biology labs at the University of Arizona. This position is a perfect fit for me and I enjoy it immensely. It allows me to use the exemplary coursework and research experiences I obtained while a student at UofA in addition to applying the passion for education I developed while teaching in New York. Further, this position allows me to work with both undergraduates and graduates to improve their scientific thinking skills and teaching skills. I work with a very dedicated group of people and feel incredibly fortunate to be part of a high quality institution like UA.

Jennifer Himes

Jennifer is currently working as a Lead Quality Systems Information Technology (QSIT) Coordinator for the Celgene Corporation, designing project workflows, managing the design and implementation of a new global document management system, as well as being the application administrator for the enterprise quality management system. Celgene is a global pharmaceutical company that focuses on the development of products for the treatment of cancer and other severe, immune, inflammatory conditions. Jennifer’s previous work at Caris Life Sciences and at the Multiple Myeloma Research Consortium at the AZ Mayo Clinic has proven to be useful in her role at Celgene; her previous experiences included quality control practices to determine the integrity of samples for downstream applications and managing laboratory audits to include compliance with industry standards and regulations.

“The education I received within the UA biochemistry program has enabled me to construct a successful career in the pharmaceutical industry. I have focused on the quality assurance and quality system aspects of the industry, becoming specialized in the management and implementation of quality systems and industry/government standards and regulations. My specialization has given me the opportunity to travel across the country to work with multiple Celgene sites, and I enjoy the fast-paced/high-demand’s common to this line of work.”

Amanda Wendt

After graduating from the UA with Biochemistry and Spanish degrees, I decided to join the Peace Corps and served two years as a Community Health Volunteer in Ancash, Peru. This experience solidified for me not only a passion for quality research but opened my eyes to the possibilities of working in public health in a global context. In 2009, I went to Emory University in Atlanta, Georgia to pursue a PhD in Nutrition and Health Sciences. Through this program, I have been able to conduct research projects with populations in Nicaragua and Kenya, as well as my dissertation research which has focused on maternal health and program implementation in Bihar, India. Through each of these steps, I have been able to rely on my strong research background gained at the University of Arizona through my biochemistry thesis work with my advisor, Dr. Darrel Goll, and my experiences in the Undergraduate Biology Research Program (UBRP). The chance for undergraduates to participate in cutting edge research at the UA is a unique and exciting opportunity that has without a doubt created a solid foundation for me as I have continued to make science and research a major part of my life beyond the UA.

Leo Bartik

Since finishing my studies at the University of Arizona, I have graduated from Johns Hopkins University School of Medicine, where I have remained for Anesthesiology residency. I also met my now wife, and took the big step of adopting a cat. During all of these major events, I have often reflected on my time as a part of the University of Arizona Biochemistry family. I do not use the word “family” lightly here. I felt a great sense of belonging in this department, where professors and administrators knew me by name. I remember hiking with Dr. William Grimse and his pet wolf, and going to a barbeque at the department chair’s house (Dr. Thomas Baldwin’s brisket was deli-cious). The Biochemistry Ambassadors program empowered me to take an active role in the life of the department. I am still very much in touch with many of the friends—student and faculty—I made during that time. For me, not only did I receive a superb education, publish research papers and enjoy some quality college basketball, but I had the chance to be a part of a department and community of people who continue to influence me going forward.

Online Extras

Online Extras
Karen Kachel Hayes BS 2006; MS 2007
My husband, Andy, and I had our child, Gretchen, in August 2012.

Chandana Sharma PhD 2006
I came to the United States in the Fall of 2001. When I decided to pursue Chemistry as my subject in college, I had no idea where it would take me. All I knew was that it would be fascinating. It was too early to think about a career; I was focusing on having fun with the subject. After completing my M.Sc. degree in Chemistry from the Indian Institute of Technology, I arbitrarily decided to go for a PhD in Chemistry. My decision was solely based on the fact that I would get to explore the United States for at least five years, and not so much on the fact that I was passionate about the subject. I enjoyed the five years as much as a foreign graduate student in a new country would enjoy. Tucson was warm and welcoming. People said hello to me even on streets. I learned quickly that cheeseburgers were meat burgers and “for-here or to-go” didn’t mean “stay here or leave.”

When I joined the PhD program at UA, I wanted to study inorganic chemistry, as I explored other departments. I got fascinated with medicinal chemistry and joined Prof. Laurence Hurley’s research group that was looking into making DNA-chelators to suppress a cancer gene. I remember attending a seminar by Prof. Hurley in the Chemistry Department on the subject. The idea charmed me and I went with it. I realized quickly that to make ideas come to reality was not easy. To get a “Dr.” prefix for your name, you needed very deep scientific thoughts, imagination and a lot of sleepless nights in the laboratory. Most of my experiments were giving me inconclusive results; I felt stuck. There were phases of deep discouragement and frustration. I was ready to get out of what felt like a never-ending journey.

I had invested time, money and my family’s hope into this program. There was a part of me telling me to complete the program and another part wanting to run away from the laboratory. I remember having a discussion with my laboratory manager about my research and my lack of motivation. He told me to stay much focused on getting conclusive results and getting through the program. I was assigned my last project, and hence my last hope to shine. I gave it my best, got results worth publishing and got out of the program adding the prefix to my name.

After five years of living in the US, I had two things with me, a PhD degree and a six-month old baby. I looked at myself and thought I had enough of academia; it was time for me to focus on family. My husband’s job took us to a new place. So I decided to take a break and spend time with my very first child. Motherhood gave me a sense of fulfillment, and gratitude. I was enjoying my stint as a full-time mother and a housewife. I was not bound by any rule. During the day, I took care of my daughter and watched television. In the evenings, I cooked and cleaned and had good time with my family.

Near the end of my third rotation studying the immune response to a parasitic brain infection, I stumbled upon research suggesting that Toxoplasma gondii, the subject of my impulsive departure from biochemistry research, could cause mice to lose their fear of cats. Cats are the primary host of this parasite and require intermediate hosts such as mice to be eaten by cats in order to complete its life cycle. This research suggested that the tiny single-celled parasite had evolved a way to specifically alter the innate hard-wired aversion that rodents had to cats for it’s own benefit. I honestly couldn’t believe it. While the studies seemed to be designed well and the results looked pretty solid, there were a lot of questions left unanswered. I ascribe my hefty (and healthy) scientific skepticism largely to the mentorship of Dr. Cordes, as he drilled into my undergraduate head to investigate every possible explanation before you believe a result, especially if it’s exciting. Ultimately, my curiosity got the best of me and I designed a thesis project to answer the question, ‘If this parasite causes loss of aversion to cats in mice, what is the mechanism by which it accomplishes this?’

Wendy Ingram BS 2007
International travel, huge media frenzies, and mind-control parasites. When I left the University of Arizona Biochemistry & Molecular Biophysics program, diploma proudly in hand, I had no idea that a mere 5 years later these things would be my reality. I am currently in the 5th year of my PhD program in Molecular and Cell Biology at the University of California, Berkeley. Following my outstanding experience studying protein evolution in Dr. Matt Cordes’ lab for 4 years, I knew without a doubt that I wanted to continue research for the rest of my life. I applied to the top graduate programs in Biochemistry and rejoiced with I was accepted into UC Berkeley’s prestigious program.

My interview with the renowned biochemist and current president of Howard Hughes Medical Institute, Robert J. Tavernier, solidified my interest in cutting edge biochemical research (specifically in his lab). Following an arduous but enthralling rotation in his lab, I decided to take advantage of the ‘umbrella’ Molecular and Cell Biology program that I found myself in and explore Genetics and Immunology labs, both subjects I had little to no previous exposure to. That’s when things got weird.

Apartment from formal education, I have also learnt that humility and simplicity are key ingredients to any career (thank you Prof. John Enemark) and that staying competitive and having a vision are fundamentals to success (thank you Prof. Hurley). Formal education is available at all institutions, it is the life lessons that stay with you. I have learnt valuable life lessons from UA professors, fellow students, colleagues and friends. That is what makes UA special for me.

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department of chemistry and biochemistry | fall 2013
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Biochemistry department. Let the adventures in science continue!
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ambassador. It felt oddly similar to recruitment weekends speaking to non- and future-sci
emailing me questions, calling to interview me, setting up radio interviews, and writing up
the mouse on top of the cat's head. While pleased with myself and the amateur photos,
(paid) intensive weeklong Biology of Parasitism course in Brazil. I was amazed to discover
that there were so many various parasites and also how much information these tiny
little ‘passengers’ knew about our biology. Finally, two years after presenting my ‘plan’ of
how I was going to pursue the mechanism of behavioral manipulation by Toxoplasma,
I returned to the same Toxoplasmosis conference, this time in Oxford, England, with a
vengeance. While I hadn't sussed out the precise mechanism, my unconventional inter-
disciplinary approach led to a surprising discovery that even if the parasite doesn’t stay in
the brain of mice, the behavior change remains.

As all graduate students do when they have a ‘story,’ I wrote up my findings and submit-
ted a manuscript to the open access journal PLoS ONE. The typical peer review process
followed, but then once my paper was accepted, I received one additional email that was
quite different. The journal wanted to promote my work in a Press Release and asked
for a couple quotes as well as any relevant fun photos. Following a quick chat with one of
my mentors, I decided to set up a little photo shoot with a friend’s cat and a mouse
purchased from a feeder store. The cat was well behaved and the mouse was foolhardy
(or just bred to be unreasonably docile) resulting in a darling set of photos including
the mouse on top of the cat’s head. While pleased with myself and the amateur photos,
I sent these off to the publisher with little expectation. A week later, I was shocked to
receive an email from a Greek reporter, wanting to discuss my research, but this was only
the beginning. In the following two weeks, over 50 reporters from all over the world were
emailing me questions, calling to interview me, setting up radio interviews, and writing up
reports on my research. As I was fielding all these reporters and their questions, I became
abundantly appreciative of my experience as a Biochemistry and College of Science am-
bassador. It felt oddly similar to recruitment weekends speaking to non- and future-sci-
entists about technically complicated yet very exciting research in simple language,
highlighting broader implications.

Ultimately, my graduate studies, adventures, successes, and impact are all directly re-
lated to the fantastic education and experience I obtained at the University of Arizona’s
Biochemistry department. Let the adventures in science continue!

Van Duong BS 2008
After graduating from UofA with a Biochemistry degree, I studied at Yale University to
complete a Master of Public Health degree in Epidemiology of Microbial Diseases. With
a strong interest in the healthcare field, I was exposed to epidemiological research meth-
ods and healthcare policy. In the ever-changing world of healthcare, it was so valuable to
see how basic science, clinical research, and policy are interconnected. After graduat-
ing from Yale in May 2010, I secured a competitive fellowship with Bayer HealthCare
Pharmaceuticals in New Jersey to work in their Global Medical Affairs and Global
Regulatory Affairs divisions. I spent 2 weeks in Berlin, Germany during the summer of
2010 to visit Bayer headquarters and to work on multiple sclerosis research. I currently
work at Regeneron Pharmaceuticals, a biotech company, in New York where my team
and I work alongside the US Food & Drug Administration to ensure compliance on
labeled and manufactured biologics.

Having a strong science background has been a tremendous asset in my post-grad-
uate education and job searches. Biochemistry is a difficult discipline, but it is very
versatile and rewarding. For me, it was the best "major" decision as an undergrad. The
people in the CBC department are genuine and truly want to help you succeed. I enjoyed
the close interactions with my peers, professors, and mentor Dr. Marc Tischler, and
especially the Biochemistry Ambassador and Mentoring programs

Ellene Mashalidis BS 2008
After graduating from UofA Biochemistry in 2008, Ellene matriculated into the NIH-Ox-
ford-Cambridge Scholars Program, an international collaborative doctoral program
funded by the National Institutes of Health. Her thesis project forged a collaboration
between the Department of Chemistry at the University of Cambridge (Cambridge, UK)
and the Tuberculosis Research Section at the National Institute of Allergy and Infectious
Diseases (Bethesda, MD, USA). As a graduate student, she characterized a novel class
of oxidoreductases that are interesting potential drug targets in Mycobacterium tuber-
culosus, the causative agent of tuberculosis. She received her PhD from the University
of Cambridge in 2013 and is now a Postdoctoral Research Associate at the Duke University
Medical Center, where she studies the structure and function of integral membrane
enzymes for rational antibiotic design.

Abbas Tuli BS 2008
I was born in Dar-ES-Salaam, Tanzania and lived in Indianapolis, Indiana for 4 years, then grew
up mostly in Kuwait until high school (in Tanzania for 2 years during the first Gulf War). In 2003, I moved
from Kuwait to Las Vegas, Nevada where I enrolled at the College of Southern Nevada. Thereafter, I was
fortunate to enroll at the University of Arizona in 2009. I graduated from the University of Arizona with
a Bachelor’s of Science in Biochemistry and Molecular Biophysics in May 2008 and was honored with the
Robert L. Nugent Award. I completed a year of coursework in Public Health-Epidemiology prior to
enrolling at Duke University School of Medicine.

While at the University of Arizona and under the mentorship of Dr. Murray H. Brilliant, I began
research on whether being a carrier for the Oculo-
cutaneous Albinism type 2 (most prevalent form of
Since coming here, I have learned many new things that will help me in my future as well as work my way towards my ever closer MD degree. As Dr. Abbas Tuli, I am now a resident in Internal Medicine at the University of Virginia in the Department of Internal Medicine. I aim to sub-specialize after completion of my residency. I would like to convey my gratitude to all my mentors and professors at the University of Arizona, including Dr. Marc Tischler, Dr. Murray Brilliant and Dr. James Hazzard. I would not be where I am today, if it was not for such tremendous mentorship I received throughout my time at the (formerly) Department of Biochemistry and Molecular Biophysics.”

**Brian Bode BS 2009**

After graduating from the UA in 2009 with a BS in Biochemistry & Molecular Biophysics and a BA in Linguistics, I decided to take a much needed holiday, and took a year off to continue my travels for a while before starting again with medical school. I decided to return to my roots, and come back to Europe to complete my medical education in order to get a change of pace from Arizona (and American) life. I decided upon studying at the University of Szeged in southern Hungary, and now as I enter my 3rd year here, I realize that I could not have made a better decision. Being half-Hungarian, I always wanted to return to Hungary and improve my language skills, as well as work my way towards my ever closer MD degree.

Since coming here, I have learned many new things that will help me in my future as a doctor, and I have made many new great friends. In particular, I thoroughly enjoy our autopsies practices for pathology every week. Our student population is incredibly diverse, with students hailing from all corners of the globe, which has provided me with the opportunity to travel even more and gain experience both in Hungary and abroad. Highlights were the 10 days I spent in Lebanon last year visiting my friend and classmate, as well as meeting up with another friend in Myanmar for two weeks earlier this year. Since I have always loved languages, I also have the opportunity to learn and practice languages with my friends here, using Hungarian, Arabic, Urdu, and Portuguese, in addition to my German and English, on a daily basis, though it definitely is a challenge sometimes talking to all our patients in Hungarian. Studying medicine is hard enough in English, let alone explaining to a patient about which vétaladvásálati (anti-coagulant) they need to take for their szívbetegség (heart disease). I was also fortunate enough to complete a five-week summer practice at the Hospital São José in Lisbon, Portugal last year, and as a result, I was able to improve my Portuguese as well as gaining an important hospital experience. Sometimes it seems like I am learning just as much about languages, politics, and other cultures as it does I am learning medicine, but I would not have it any other way.

Even though it has been a few years since the last time I stepped on the UA campus, I frequently and fondly remember the time I spent there and the people I met, and how it all helped lead me to the place I am today. I look forward to what the future has in store for me, and after graduation, I hope to move to Australia and become a neurologist or surgeon.

**David Durazo BS 2009**

I am currently employed as a federal agent by the Department of Homeland Security. While my degree is not an immediately apparent function of my job, it was instrumental in helping me secure my position throughout the rigorous selection process. It will come into play later, however, as my plan is to climb up the ladder and make my way into a crime laboratory for either the CIA, DEA or FBI agencies as a biochemistry/forensic specialist.

**Alice Ferring BS 2009**

After graduating from the UofA with degrees in Biochemistry and MCB in 2009, I have had the privilege of pursuing an MD-PhD degree at the University of Arizona College of Medicine in Tucson, AZ. I am currently working on my PhD in the Physiological Sciences Graduate Interdisciplinary Program (GIDP) under the guidance of my wonderful mentor, friend, and role model Dr. Zain Khalpey, MD, PhD, MRCS. In Dr. Khalpey’s lab, I have been given the opportunity to apply the culmination of academic and intellectual skills I have learned and developed thus far towards our research. My dissertation project involves, but is not limited to, heart and lung organogenesis and regeneration, 3-D printing of stem cells and scaffolds, novel methods of CT/MRI imaging, and cellular bioenergetics and metabolism. Having had a solid undergraduate foundation in biochemistry, molecular and cellular biology, math/physics, and bio-engineering has made all the difference in my research. But above all, I definitely would not be where I am today were it not for the excellent professors and staff of the Chemistry and Biochemistry Department who supported, trained, and encouraged me along the way. Many thanks to all the wonderful people in my life who have helped me over the years!

**Erin Acino Brettmann BS 2010**

This past April, I married Joshua Brettmann, a graduate student in the Biochemistry program here at Washington University in St. Louis. While we got to know each other at WashU, we actually met on an interview at a different university and only by chance wound up at the same school. Now we troubleshoot each other’s experiments and edit
Joseph Farmer BS 2010

It's funny how life works sometimes. When I graduated in 2010 with a Biochemistry degree, I had no idea what I wanted to do exactly. My passion had always been healthcare and science, but I found myself at a loss of how to pursue those goals. Within a year of finishing my program at the UofA, I found myself combining my love of science and healthcare with an emerging love of teaching in the EMT program at Pima Community College. I then spent the next 3 years as Adjunct Faculty at Pima teaching the first responders of our southern Arizona community.

At this point, I decided that teaching was the right place for me. My time at Pima coincided with my first few years coaching high school swimming, and I decided that I wanted to share my passion for chemistry with others. To this end, I obtained a teaching certificate in secondary education with the goal of teaching chemistry in a local high school. Starting this year, I am teaching chemistry, AP chemistry and coaching the men's swim team at Rincon high school. My goal here is show my students that they can pursue a science major in college and a career in the sciences. The future scientists are the high schools students now, and if I can inspire but one person to chase their dream in chemistry, I'll consider it a great success. Our education system is in need of teachers in science and math. I take great pride that my teachers and experiences as a Wildcat gave me the ability to fill that need. Bear Down.

Jennifer (Heck) Hollinger BS 2010

Since graduating from undergrad and leaving the Biochemistry department, a lot has happened. I went straight through to medical school while staying in Tucson. I got married in March of this past year and we adopted a puppy last November. My background in biochemistry and molecular mechanisms has helped me a lot during my medical training. As I write this, I’m currently on a visiting clerkship (aka “away rotation”) at Stanford University in the Pediatric Genetics department during my last year of medical training. All of the biochemical pathways that I learned during our core biochemistry class (and were repeated during medical school—thanks to Dr. Marc Tischler) are coming in handy as we counsel and treat patients with genetic mutations that cause errors in their metabolism.

Other than helping me specifically on this rotation, I know my degree in biochemistry helped prepare me to approach problems in a scientific manner, it introduced me to looking to the primary literature to help solve a problem (something that I use constantly while thinking about complicated patients) and it helped me gain appreciation for the research and hard work that impacts how I treat my patients.

Finally, but most certainly most important, the biochemistry department helped make the University of Arizona feel like home. The UA was where I met my husband (who also took some of the biochem courses and is now an Emergency Department resident), where I bonded with my closest friends (the closest was my partner in crime to all of the department event—Dawne O’Brien—we’re still very close) and where I came to love the city of Tucson. I’m grateful to the department for its inviting atmosphere and the number of events that it put on to help our department grow closer together and be involved in the University community.

Alberto Rascon PhD 2010

I graduated in 2010 with a PhD in Biochemistry working in the lab of Dr. Roger L. Miesfeld. While working in Dr. Miesfeld’s lab, I knew I wanted to pursue an academic career. However, I was unsure if I wanted to pursue more of a teaching career at a smaller state university or pursue a research career at a major research one (RO1) institute. Fortunately, I found a couple of teaching/research postdoctoral programs designed to not only provide the intense research needed for an academic research position, but also provide the necessary training to develop proper teaching skills. The postdoctoral programs that I applied to were the Howard Hughes Medical Institute (HHMI) Teaching Postdoctoral Fellowship in the Dartmouth Undergraduate Science Education Program (Dartmouth College, Hanover, NH) and the Institutional Research and Academic Career Development Award (IRACDA) program through the National Institutes of Health (NIH). With the IRACDA program, the fellowships are school specific to the application process involved applying directly to the institutions of interest. Therefore, I applied to the PENN-Postdoctoral Opportunities in Research and Teaching (PENN-PORT) program at the University of Pennsylvania, the IRACDA program at the University of California, San Diego (UCSD), and the IRACDA Scholars in Science (SIS) program at the University of California, San Francisco (UCSF). I was offered fellowships from all three IRACDA programs and was selected as one of three finalists for the HHMI postdoctoral fellowship. After looking at all my options, and discussing this with my family, I withdrew from being a candidate for the HHMI fellowship and chose the ISIS program at UCSF.

I started my postdoctoral fellowship in 2011 in the lab of Dr. James H. McKernow, a leader in parasite protease biochemistry. I worked on several parasitic worm/amoeoba proteases and enzymes, all while teaching biochemistry at San Francisco State University with my teaching mentor Dr. Teaster Baird. I learned so much from working in Dr. McKernow’s lab (even publishing a review article as a first and corresponding author) and getting my teaching experience with Dr. Baird. In fact, because of my successful postdoctoral/teaching training I was five-for-five in on-campus interviews and offered three faculty positions at three different California State University schools. Currently, I am in my first semester as an Assistant Professor of Biochemistry at San José State University. I am in the process of starting my laboratory research, which is on mosquito proteases, a project that I started with Dr. Miesfeld here at the University of Arizona. I was so intrigued by my work with Dr. Miesfeld, but also by the mosquito protease work from the lab of the late Dr. Michael Wells that I knew I wanted to keep this work going. Without my experience in the Chemistry and Biochemistry department at the University of Arizona and my ISIS postdoctoral training has given me the necessary tools to be an effective mentor and hope to be the best mentor for my undergraduate and graduate students.

On a personal note, my family and I are more than ecstatic to have returned to California. We are a lot closer to our families, but do still miss the ties we have at the University of Arizona. In case some of my graduate school classmates read this, Flor, Celeste, and
little Alberto (Buddy) wanted me to say hi to you all. Many people may not be aware of this, but my kids grew up in the lab on the fifth floor of Bio Sciences West. All my classmates knew them very well, and in fact, my kids might have attended more Masters and PhD thesis defenses than any graduate student I know. They are all doing very well. Celeste has just started her first year in middle school. Yikes! Buddy is in third grade, and I am happy to report that they are in the top 2% of their classes. For is hanging in there, being the rock of the family, getting us all ready for school, and on top of that, working at my little guy’s elementary school (looking after other people’s kids). What a trooper! However, she fell in love with teaching and is looking forward to getting her Masters in early childhood development so that she can teach kindergarten and first grade.

Christian Roessler PhD 2010

When I graduated from the Biochemistry doctoral program I had a biochemistry skill set which included protein production and purification, biophysical analysis of protein structures, and experience running instruments such as NMR spectrometers and FPLC systems. None of that directly translated into my current position as a postdoctoral researcher in the Photon Sciences Directorate at Brookhaven National Lab. Upon arriving at Brookhaven, I immediately found myself surrounded by materials chemists, particle physicists and environmental biologists, all working alongside each other at a particle accelerator called the National Synchrotron Light Source. The Structural Biology Group itself is composed of more engineers, machinists and computer scientists than structural biologists, and I had to quickly adapt in order to fit in and accomplish my research goals.

I am extremely lucky to work on a project that applies new technology based on acoustic sound waves to eject fluids without touching them. It sounds like science fiction, but it’s based on principles first demonstrated in the 1920’s. Our group uses this technology to take tiny, delicate protein crystals suspended in solution and place them into a beam of x-rays no wider than a human hair. A major test of this acoustic system was recently conducted at a state-of-the-art x-ray laser facility in Stanford called the Linac Coherent Light Source. There, our group and about 20 other researchers from academia, government and industry used a prototype acoustic device to shoot protein crystals directly into the x-ray laser beam, timing each shot so precisely that every sub-picosecond x-ray pulse hit a newly ejected protein crystal in midair. We are very excited by the results of this experiment—we hope to publish these results shortly and are looking forward to implementing acoustic protein crystal injection at Brookhaven, Stanford, and other x-ray light sources around the world.

Although the skills I acquired at the UoA only loosely apply to my research project at Brookhaven, the general training I received during my doctoral studies in how to think like a scientist has enabled me to lead others and produce results in this extremely challenging and competitive field. At the same time I try to balance work with my personal life, including taking weekends off from lab work to spend with my wife and our new baby daughter. It’s important to find balance and healthy outlets to maintain focus and prevent burn-out.

Although Long Island, New York doesn’t have scenic mountain ranges like the Chihuahua to explore, it does have an abundance of farms, good Italian food, and the close proximity of New York City to offer.

Kimberly Yang BS 2010

Kimberly Yang, the University of Arizona, Biochemistry and Molecular Biophysics, Class of 2010 and a third-year student at the University of Arizona College of Medicine – Phoenix, has been named one of 10 National Outstanding Medical Students by the American College of Emergency Physicians.

Kimberly, who has participated in a number of extracurricular programs in her first three years of medical school, was nominated by Eric Katz, MD, vice chairman of education at Maricopa Integrated Health System, and Teresa Wu, MD, the director of ultrasound at MIHS.

“It is such an honor,” said Kimberly, who has been working in the MIHS emergency department on her scholarly project and plans to pursue the field upon her completion of medical school.

The American College of Emergency Physicians, with more than 28,000 members, honors medical students who intend to pursue a career in emergency medicine and who have demonstrated outstanding patient care and involvement in medical organizations or the community.

The award recognizes students who excel in compassionate care of patients, professional behavior and service to the community and specialty.

Kimberly receives a year membership in the group, registration to the college’s annual meeting and a plaque from the group.

The college selects students on the basis of humanism, professionalism, clinical judgment, scholarly achievement, extracurricular activities and research.

Kimberly states that “Emergency medicine was my first exposure to medicine and I’ve always been drawn back to it,” also “It’s a fascinating specialty that speaks to me in so many ways.”

Kimberly said she likes the busy nature of the field and multitasking but it’s more than that.

“In Phoenix, at least, it’s a great opportunity to reach the underserved,” she said. “A lot of uninsured patients come to the ED (emergency department) and so it is kind of a primary care setting as well. I find it so rewarding to work with that population.”

Jennifer Collins BS 2011

After graduating from the UoA, I took two years off from school to gain real world experience before going back to school. Aside from my job as a surgeon’s aide, I decided to obtain an EMT license through Pima Community College and finished at the top of my class, mainly due to the knowledge I gained through my studies at the UoA. I also interned at the International Rescue Committee, a nonprofit organization that helps resettle refugees from some of the world’s worst humanitarian crises. Looking back, I’m extremely happy that I took two years off to open my eyes to possible career
options. However, the most exciting part of my two years off occurred in April 2013 when I married my long-term boyfriend (also a UA alum) in Sedona, Arizona.

Because of my biochemistry education, I feel very prepared for my graduate studies in epidemiology. Not only did biochemistry teach me how to study effectively, but also I learned biology and chemistry in-depth, which is helping me in my current studies. I believe I can conceptualize certain topics more than others in my courses who did not receive such extensive scientific training. Without my biochemistry education at the UoA, I feel like I would not have been quite as successful as I am now or as I have been in the past two and a half years. I am extremely grateful to those in the Department of Chemistry and Biochemistry who were there supporting me through my studies.

**Tara Hill BS 2011**

Since graduation my career aspirations have changed drastically. When I entered the Biochemistry and Molecular Biophysics program in August 2007 I had planned on going to medical school to become a forensic pathologist—“a speaker for the dead.” However, when I added my minor my senior year things began to change. I enjoyed the classes—and I could see myself becoming a teacher, upon my graduation in May 2011.

After graduating in 2011, I took a year off of school, when I worked as a one-on-one paraprofessional for a (at the time) second grade student with autism. My educational background and love for science was what got me the job. As of August 2012, I started my graduate program at the University of Arizona; I will receive my MA in Special Education, with a teaching certificate to teach students with visual impairments in December of 2013 (assuming I pass my written, oral, and braille comprehension exams in October).

As a teacher of students with visual impairments (TVI) I will work with students on academic assignments—specifically providing adaptations as needed. Additionally, I will help these students with daily living (cooking) and self-advocacy (becoming independent). I am grateful to be in the lab of Drs. Lynne Oland and Leslie Tolbert; I gained expertise in the study of the inner ear taking molecular, genomic, and electrophysiological approaches to studying mechanotransduction. The Wong lab designs and implements tools for studying biophysical phenomena at the single molecule level. I am working between the two labs to develop tools to study mechanotransduction in the inner ear one molecule at a time.

In addition I have been working with some close friends and colleagues here on growing a high school science outreach program called HiPREP, Health Professions Recruitment and Exposure Program. The program now operates by bringing in 60 underserved and underrepresented students, selected from an applicant pool of roughly 300, to Harvard every Saturday for 9 weeks. These are students who want to escape their circumstances, but lack mentors and role models in their communities. At each session, we provide the students with four hours of interactive curriculum and lab tutorials. Each student is paired one-on-one with a mentor with whom they can discuss challenges they are facing and get advice on applying to college and making it through a science curriculum.

We also have a writing program where students work with their mentors on a resume and polishing two pieces of writing which they can use for college, job, or summer program applications. After completing the writing program the students work with their mentors on a literature-based research project which concludes with the students giving a PowerPoint presentation in front of an audience of their family, friends, and peers. This year we have tripled our budget and have instituted a nutrition program, transportation subsidies, and dedicated computer access for the students. We are in the midst of incorporating as a 501c3 nonprofit organization and are setting up an infrastructure to ensure the program outlives our tenure here at Harvard. We are fundraising now to increase our budget ten-fold to facilitate hiring of dedicated staff to ensure that the program has year round support and can continue to grow.

The skills I gained at the University of Arizona have been crucial in my ability to be successful here at Harvard. I learned how to become a scientist in the lab of Drs. Lynne Oland and Leslie Tolbert; I gained
my foundations in chemistry, physics, and biochemistry from my course work; I learned how to teach effectively through being a teaching assistant for organic chemistry labs under the supervision of Dr. Anne Radics, and had the opportunity to engage in science outreach with the help of Carol Bender through the Undergraduate Biology Research Program (UBRP). Most recently, the skills I gained from working with Dr. James T. Hazard on organizing the Biology Engineering Chemistry Undergraduate Research (BECUR) conference have come in handy in organizing a seminar series on the role of mechanical forces in biology. I am eternally grateful for my time, experiences, and interactions at the U of A.

The AHR in obesity-induced inflammation.

Obesity induces chronic, low-grade inflammation that contributes to several of the comorbidities associated with obesity (i.e., insulin resistance and Type 2 Diabetes). One of the physiological roles for the AHR is immune cell differentiation, specifically IL-17 secreting T helper cells (Th17s) and the immunosuppressive regulatory T cells (Tregs). As such, another principle component of my thesis will involve determining a role for the AHR in obesity-induced inflammation.

Kristen Sanders BS 2011

After graduating from the UofA, I took a year to enhance my education from a non-student perspective before pursuing my graduate studies. In my gap year, I worked as a pharmacy volunteer at El Rio Community Health Center, which helps to provide affordable healthcare to underserved populations in Tucson. I also kept sharp on my studies by working as a teaching assistant for organic chemistry lab at the UofA. What stands out most to me in this time, however, was my chance to see more of the world by visiting Ireland, France, British Columbia, Quebec, and cities all over the United States. After a fulfilling education, my gap year provided me with incredible new experiences and I found that taking time off before graduate school was truly one of the best decisions I have ever made.

Online Extras

The Catalyst CBC alumni magazine

Assistant Professor of Chemistry and Biochemistry | Fall 2013

While completing my degree at the University of Arizona, I did my senior thesis research in the laboratory of Dr. Serrine Lau in the department of Pharmacology/Toxicology in the College of Pharmacy. This experience promoted my interest in the interdisciplinary nature of Pharm/Tox research, and I am now studying at in the Program for Experimental and Molecular Medicine (PEMM) at Dartmouth College. Having just begun my second year of graduate school, I am in the lab of Dr. Craig Tomlinson at the Norris Cotton Cancer Center. Our research primarily focuses on obesity, and the underlying molecular mechanisms. In particular, we are interested in the role of the aryl hydrocarbon receptor (AHR) in the onset and development of obesity. The AHR resides at the interface of xenobiotics and subsequent physiological responses, as its function was first identified to be the receptor for numerous toxicants (as its name suggests). These effects are mediated in a transcriptional manner—upon binding to its ligand, the AHR is translocated into the nucleus and dimerizes with its nuclear translocator (ARNT). Together, the AHR/ARNT complex then binds to dioxin response elements (AREs) in the promoters of various genes; many of these genes are involved in xenobiotic metabolism (most iconic of which are members of the CYP450 family) and related pathways.

While the context for AHR research has long been toxicological, it is now known that it also has endogenous ligands which elicit differential and specific gene regulation, important for development, hematopoiesis, and immune cell maturation. Additionally, previous research in our lab using mice with a mutant AHR with ten-fold less affinity for its ligand implicated the AHR in obesity. From this initial screen in mice fed both control and high fat diets, a role for the AHR in diet-induced obesity was confirmed. The specific role and mechanism by which the AHR mediates this effect in mice is as yet unknown; my research will include elucidating the contribution of the AHR to diet-induced obesity.

Obesity induces chronic, low-grade inflammation that contributes to several of the comorbidities associated with obesity (i.e., insulin resistance and Type II Diabetes). One of the physiological roles for the AHR is immune cell differentiation, specifically IL-17 secreting T helper cells (Th17s) and the immunosuppressive regulatory T cells (Tregs). As such, another principle component of my thesis will involve determining a role for the AHR in obesity-induced inflammation.

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A year off of school was no hindrance after utilizing the UofA’s excellent resources as an undergraduate. When my focus shifted towards graduate school, I received offers from several top-ten-ranked schools. My love of chemistry and biochemistry coupled with my newfound interest in the pharmaceutical industry led me to study medicinal chemistry at Northwestern University, where the drug Lyrica® was founded.

The UA Department of Chemistry and Biochemistry could not have prepared me better for my graduate studies at Northwestern. The knowledge imparted from my professors and the analytical thinking skills they strengthened helped me tremendously in graduate school. Their help facilitated me in passing all of my graduate school entrance exams, being among the top students in my courses, being well prepared for my job as an organic chemistry TA, and winning the Allen S. Husey Award for Excellence in 200-Level Teaching. I know my UofA education will continue serving me well as I advance in my graduate studies and prepare for a career in teaching.

Jose Techner BS 2011

I graduated from the University of Arizona in 2011 and proceeded to Northwestern University Medical Scientist Training Program which is an NIH-subsidized dual MD-PhD program. I am currently in my third year of the program and I just started the PhD program in Chemistry. This past year has been a whirlwind of activity: I passed my USMLE Step 1 exam, completed a clerkship in Neurology, wrote and submitted a grant, studied and passed assessment chemistry exams and I am now about to begin working as a TA for general chemistry labs. I joined the lab of Milan Mrksich which specializes in surface chemistry and bioengineering at the interface of cells. My personal project will revolve around developing high-throughput assay to profile glycosyltransferase activities. I want to salute the undergraduate biochemistry program for preparing me for rigors of medical school. Their help facilitated me in passing all of my graduate school entrance exams, being among the top students in my courses, being well prepared for my job as an organic chemistry TA, and winning the Allen S. Husey Award for Excellence in 200-Level Teaching. I know my UofA education will continue serving me well as I advance in my graduate studies and prepare for a career in teaching.

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Aeen Asghar BS 2012

After graduating from University of Arizona with a BS in Biochemistry and Molecular Biophysics and a BA in Near Eastern Studies in 2012, I continued my studies at the University of Iowa Carver College of Medicine. However, during the summer before school began, my family and I went on a three-week road trip from Phoenix to Canada and down to California. It was a great experience and one of the last opportunities for me to spend quality time with my family. Moving to Iowa was a big change for me. It was the first time I lived so far away from my family and friends. Until that point, I always saw Tucson as a college town, but when I moved to Iowa City, I realized what a true college town is. While it is a small town there is so much to do and has a very lively undergraduate crowd that does not shy away from party school rankings.

During my first semester medical biochemistry course, I realized that the biochemistry program had prepared me well. Not only for the biochemistry section but the general rigor of medical school. First year was very difficult yet I enjoyed every minute of it. Whether I was spending time with my friends or studying for my anatomy exam, I knew that I would actually be using everything that I was learning. It is essential to live a balanced life in medical school since it can easily overtake one’s entire life. That is why it is essential to continue to do things you like and set time aside for exercise and a social life.

My research background also proved to be helpful. I did three years of research from bench to translational to clinical at the UA. This past summer, I joined a surgical oncologist and assessed predictive variables of pancreatic cancer recurrence. I was also able to shadow my mentor in the clinic and OR in order to get a holistic understanding of the field. The summer concluded with my oral presentation during the college research day. I was also able to have a fabulous mentor in Dr. Campos, who was always encouraging and supportive. I plan to apply to the PhD program in epidemiology after finishing my MPH this year, and I know that I will continue to appreciate and apply many of the skills I developed in my undergraduate studies in the CBC program at UA.

Kristin Bratton BS 2012

I would like to start by thanking the University of Arizona’s Department of Chemistry and Biochemistry for providing me with the opportunity to conduct research during my undergraduate studies. My research experience at the University of Arizona was a true learning experience, and I am grateful for the opportunity to have worked with such dedicated and inspiring faculty members.

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Aubri Carman BS 2012

I won the Benjamin H. Kean Travel Fellowship in Tropical Medicine from the American Society for Tropical Medicine and Hygiene, which provided me a round trip ticket and $1,000 towards living expenses for the clinical research fellowship I completed this summer in Lusaka, Zambia. There are 20 Kean fellows nationwide, selected through a highly competitive process, and this is the only award that recognizes medical student commitment to tropical medicine practice.

In Zambia, I spent eight weeks working at Tiny Tim and Friends (TTF), a non-governmental organization that runs a pediatric HIV clinic. My project was focused on analyzing different methods for tuberculosis diagnosis in HIV-positive adolescents. Specifically, we were interested in learning how the clinic’s symptom-based screening questionnaire compared to traditional microbiological techniques such as smear microscopy and bacterial culture, as well as a new PCR-based assay called GeneXpert.

I am very thankful for the Kean Fellowship, as it enabled me to obtain on-the-ground field experience in tropical medicine and global health, which I believe is the most important part of my development as a clinician and researcher interested in such topics. I have found that it is nearly impossible to understand the complexities and barriers presented in practicing tropical medicine and implementing research projects in developing countries unless one has experience on the ground, as the day-to-day challenges are unique and can be immensely frustrating, yet the triumphs extremely rewarding.

You can read more about the Kean Fellowship and my selection as a fellow at: https://sites.google.com/site/2013benkeantfellowshome

Troy Comi BS 2012

After graduating, I left my longtime home of Tucson for Urbana to pursue an MS in chemistry at the University of Illinois. I decided to join Professor Richard Perry’s mass spectrometry lab as the work melded my diverse interests and background knowledge in chemistry and the CBC program at UA.

My classes in the Chemistry and Biochemistry Department ensured I was highly prepared for a graduate-level education. As a biochemistry major, I learned to think critically and creatively to solve problems and build a strong foundational knowledge in the sciences—one that would help me in my future career as a public health student and professional. My thesis research, working in the lab of Dr. Samuel Campos studying the molecular basis of HPV infection, was instrumental in shaping my interest in vaccines and vaccinology—an interest that I have continued to pursue as a graduate student. I was also lucky to have a fabulous mentor in Dr. Campos, who was always encouraging and supportive. I plan to apply to the PhD program in epidemiology after finishing my MPH this year, and I know that I will continue to appreciate and apply many of the skills I developed as an undergraduate in the CBC program at UA.
with an analytical method I had previously only used in lab courses. I am developing new mass spectrometry imaging tools to better study tumor growth and response to anti-cancer drugs. My classes in the CBC department more than prepared me for graduate school, and the numerous research opportunities at the UofA, such as UBRP and the Beckman scholars program provided me with graduate-level research experiences. I don’t have my next steps laid out yet, but I have a few years to figure it out. Chemistry is my passion and the CBC department gave me the tools I needed for success and made me the scientist I am today. I’m grateful for the training and mentors who helped along the way.

Diana De La Torre BS 2012

After graduation, I took a semester off to enjoy my family and visit Colombia, where I got to explore the country and relax before my big move to Texas. Since I started my undergraduate research career at Dr. Todd Vanderah’s lab, I realized graduate school would be the next big step for me. I joined the PhD program in Pharmacology and Toxicology at the University of Texas at Austin in August 2013. Currently on my first laboratory rotation, I am working on analyzing HMGB1 proteins depletion in the SSA DNA repair pathway.

I am very thankful with the professors and advisors that helped me pave the way to graduate school. Truly believe I am where I needed to be. Special thanks to Dr. Carol Dieckmann, Dr. Tsu-shuen Tsao, and Dr. Oliver Monti, who really helped me in the graduate school application process. I love my current research, but I will always miss those long days on campus. I truly miss Arizona and cannot wait to be back!

Judith Jenkins PhD 2012

After completing her doctorate with Professor Neal Armstrong, Judy took a post-doctoral research position with Professor Scott Saavedra. Her current research uses transient absorbance spectroscopy to measure ultrafast molecular photodynamics in chromophores for use in solar energy conversion platforms. When she’s not in the lab, Judy takes every opportunity to enjoy the Tucson sunshine or visit her family!

Rodrigo Lopez BS 2012

I am currently a Process Design Engineer for ExxonMobil living in Beaumont, Texas. Having been with the company for one year, I have already gained an incredible amount of experience. In past year, I have scoped and developed $4 million dollar projects, conducted unit inspections, and explored the implementation of new technology. My position here has given me the opportunity and resources to participate in community outreach. This past year, I ran the JASON Project and Marketing Yourself to Industry Event at Lamar University. In the JASON Project we performed a “Diet Coke and Mentos” experiment to over 480 middle school students to inspire and motivate students to study and pursue careers in the STEM (Science Technology Engineering and Math) fields. The Marketing Yourself to Industry event provided Lamar University engineering students with tips on how to effectively market yourself to recruiters, in addition to conducting mock interviews with the over 120 engineering students. These events allowed me to be nominated and earn the 2012 Basic Chemicals Global Excellence Award.

Having moved away from my family and living alone has allowed me to expand my horizons and develop new interests. Outside of work, I spend much of my time cooking, traveling, and playing sports. My passion for food has developed over the years. Stemming from my visits to restaurants around the US and realizing the unmatchable quality of traditional Spanish home cooked meals from my childhood. I have also spent much of my time off traveling. In the past year I have visited Washington DC, Chicago, Boston, and have had multiple trips to Houston and Austin for their local events. My favorite trip was to Venezuela, where I visited the world’s largest waterfall, Angel Waterfall, in Venezuela. It was a very surreal experience because slept overnight in cots, showered in river water, and hiked extensively to see the sites.

Although I look forward to the years I have ahead of me, I will never forget the foundation the University of Arizona provided me for my success. Whether it was the cutting edge research I conducted, outreach events as a Biochemistry & Chemistry ambassador, or enjoying coffee at local mom & pop coffee shops—my experiences at the University of Arizona has prepared me for my “adult life” and as a full time employee. Most importantly, I have developed lifelong friendships who have continually motivated me and supported me even after my graduation.

Xin Ma MS 2012

After graduation, I followed Professor Vicki Wysocki to transfer to the Ohio State University to complete my PhD program. I continued my research about the application of mass spectrometry in protein/nucleic acid complexes. I have determined the stoichiometry of RNase P from Pyrococcus furiosus. I am preparing to publish the work. I also focus on the development and application of surface induced dissociation (SID) which is an activation method in mass spectrometry. Our target is to finally commercialize the technique to serve more scientists.

Tarik Ozumerizfon BS 2012

Slightly more than a year after I left Tucson with my degree in chemistry, I currently find myself in Fort Collins, Colorado working towards my PhD at Colorado State University. I’m a second year graduate student working for Eric Ferreira in the organic division. We’re a reaction methodology development research group and I’m currently working on a short total synthesis which demonstrates a method previously reported by our group.

It’s been a fun and interesting year since leaving the U of A. I’ve felt myself growing both as an individual and a professional. The undergraduate experience I had in Tucson was an invaluable part of my development as a chemist. I especially owe gratitude to Professors Zhijie Zheng, Elizabeth Veriing and Eugene Mash for letting me into their groups and experience research in several different chemistry disciplines.

When I’m not at my hood (see how happy I am in this picture?), I find myself exploring the surrounding area. Before this year, I had never lived outside of Arizona, so naturally all of the green (and for a few months, the white) was quite a shock to me. Now, I find myself shurgging at highs in the 30’s (F, not C) and forgetting what it was like to see triple digits for over four months.

I miss all of the interactions I would routinely have with faculty, staff and even gradu...
ate students during my UofA years. I am sincerely appreciative to all of the people that supported and encouraged me while I was there. As I make my way along the graduate school path away from Tucson and towards Utah, I will remember your kind words. Next time I'm in Tucson, I'll be sure to stop by and check in, and until then, I'll still be rooting for the Wildcats!

Liana Tirsiklin BS 2012

I am currently a second year graduate student at San Diego State University, in the dual Major's program in Exercise Physiology and Nutritional Sciences. During my time so far, I worked with the San Diego State University Research Foundation with a program entitled Academia Fit, as well as Familias Sanas y Activas, which provided free fitness classes in the Latino community of the south bay region of San Diego. My role initially was to collect anthropometric data on the participants, and then I began performing an analysis, SOFIT-X, which was a momentary time-sampling protocol that analyzed the effectiveness of the fitness classes. My role also evolved into mentoring the aspiring instructors, providing them with resources and evaluations for continual improvement. In the meantime, I continued teaching fitness classes all throughout San Diego, expanding my teaching abilities and repertoire. At the conclusion of my first year, I found myself presented with a unique opportunity that I had not considered as a possibility before, as a result, I am now the fitness manager at the SDSU Aztec Recreation Center. My work here involves the supervision of 50 group fitness instructors, 10 personal trainers, and I also run an internship program for 5 kinesiology majors every semester to get them familiar with as many aspects of the fitness industry as possible.

Although this seems to be a drastic switch from biochemistry, I am very thankful for the education and experiences that I received at the University of Arizona. To be honest, this was the ultimate direction that I wanted to go in when I started my undergraduate career (and as a result led me to declare minors in math, nutritional sciences, and physiology), but I wanted to make sure that I had the proper educational foundation, and the extreme rigor of the biochemistry program more than prepared me for my graduate studies, between juggling 30+ hours of work per week and going to school full-time, for the first time, I have a 4.0 GPA! In addition, the variety of experiences that the UofA offered, from mentoring first generation, low income, and disabled students through the Student Support Services/TRiO and New Start programs, to working at the Arizona Nutrition Network, to completing my senior thesis laboratory work with Dr. Tsu-Shuen Tsao, outfitted me with a multitude of skills that I have had to tap into so far. There were many points throughout my career where I doubted myself and whether I could complete the program, but through perseverance and hard work, I know I came out a stronger person, ready for almost anything.

Married life in San Diego is fantastic! This is definitely the place to be for where I see myself developing as a professional, and I can’t complain about the wonderful weather and beach access, despite missing Tucson. It’s funny hearing people complain here about how hot it is when school starts, because after years of (45°) conditioning in Tucson, we know what hot is!

Tyler Chozinski BS 2013

My name is Tyler Chozinski and I’m currently a first year graduate student in the Department of Chemistry at the University Washington, Seattle as well as one of many proud UofA alumni. I graduated from Arizona in 2013 with a BS in chemistry as well as a minor in mathematics. During my time at UA, I was a part of undergraduate research in both Dr. Katrina Miranda’s lab and Dr. Jeanne Pemberton’s lab. Both of these research experiences, as well as the education I received at UA, prepared me amazingly well for my future in chemistry. I applied and was accepted to the University of Oregon, the University of Washington, the University of North Carolina Chapel Hill, Duke University, and the University of Texas at Austin graduate chemistry programs. It was a hard decision between UW and UNC, but in the end, I decided UW was where I fit in best. And getting to live in Seattle is a BIG plus! I began research early in the summer this year with Dr. Josh Vaughan, a brand new professor here at UW. My research topic is super resolution fluorescence microscopy in which we use a technique called Stochastic Optical Reconstruction Microscopy (STORM) to defeat the diffraction barrier of light which limits other far field optical techniques to a resolution of about 250 nm. With STORM, we’re able to get a resolution of tens of nanometers and part of my work here is going towards improving that number by engineering different fluorescent dyes that exhibit the properties needed for STORM imaging. I’ve learned a TON so far: we built an epifluorescence inverted microscope with 5 different lasers going into it, I’ve learned a ton of optics, some programming, some electronics, I did some purchasing of lab equipment and instruments, as well as tons of reading. I don’t think I’ve ever gone through so many highlights. All of this work will pay off in the end because our group is set to release a review of dyes used in STORM within my first year and another in late 2014. While it is a lot of work, I am excited to really get into the research, the teaching, and all of the learning experiences I know I’ll gain in grad school. I definitely don’t miss the heat or Tucson very much, but I do miss CBC at UA!°

Melissa Gifford BS 2013

I moved up to North Phoenix immediately upon graduation and after a week of settling in, started my new job at W. L. Gore & Associates (Gore). Currently, my commitments at Gore include being a Process Engineer supporting catheter manufacturing. I do not use much of my chemistry background, per say, but the Chemist inside of me is still fulfilled due to the core technology of Gore being founded on chemistry. What is cool is I have several career paths available to me within the company that can get me back in the lab doing research and development of the chemicals and materials that make up Gore’s products. That excites me that I have so many avenues open because of having both a Chemistry and a Chemical Engineering degree! Looking forward to what the future of my career brings and I am enjoying every bit of what I’m doing in the present.)

Kara Smith BS 2013

I would not say that I followed the path of a traditional collegiate student. I enlisted in the US Navy in 2007 as a Nuclear Machinist’s Mate. I was selected to become an officer and earn my undergraduate through the Navy’s Seaman to Admiral -21 (STA-21) program. Upon receiving my orders, I entered the Chemistry program at the University of Arizona in the summer of 2010. Thanks to the support and understanding of the entire department, I was able to complete my degree in three years while remain-
Two weeks following commissioning I moved cross-country to attend the Naval Nuclear Power School in Charleston, SC. The curriculum here is based on graduate level nuclear engineering and physics classes, and is instructed at a pace that allows us to finish 10 courses in a span of six months. The best way to describe it is trying to take a sip of water from a fire hose. I will finish this school in December, and then move on to the Nuclear Prototype (6 months), which is an operational nuclear reactor and submarine engine room that allows both officer and enlisted students qualify as operators. Upon completion of the entire training pipeline, I will have earned half the credits necessary for a Master of Science in Engineering Management, and plan to finish the online coursework through Old Dominion University during the down time between deployments. I’m excited to learn and see what new adventures life in the Navy will bring me. Thank you to everyone in the Chemistry and Biochemistry Department that looked after me for those three years and helped me to be successful in reaching my goals.

Lauren Wugalter BS 2013

Since graduating I have been working in a research lab at the University of Washington to prepare myself for the research-intensive PhD program here. Starting at the end of September I will begin teaching undergraduate lab courses and taking classes while continuing to do chemical biology research. I plan to get a PhD in chemistry, and to pursue a career in education.

Because of my experience at the University of Arizona and with the CBC department, I not only found a curiosity for science and research, I learned about my passion for science education and outreach. The work I did as the Executive Outreach Coordinator for the Student Affiliates of the American Chemical Society, and with the local Southern Arizona ACS section, helped me to reach out to a range of students from across the Tucson community and to inspire excitement about science to students who normally would not have had the opportunity. Although I am pursuing a PhD in chemistry, I will always continue to teach and to inspire scientific curiosity in future generations.
I have also begun teaching GRE courses as an instructor for Kaplan. I look forward to students to write and polish up these essays before they are submitted. More recently, Great LA Personal Statement Weekend in which we partner 200 volunteers with 200 personal statements for college applications. In early November, we will be hosting our privilege of working with the seniors of several LA high schools in helping them craft their college career.

Many things were unexpected. Included in all the dashing I did in those few months was asking for letters of recommendation and applying for scholarships and awards. These pursuits came to fruition, resulting in a Gilio Circle Scholarship, Samuel McMillian Memorial Scholarship from the Department of English, MCB Outstanding Senior Award, College of Humanities Outstanding Senior Award, and the very surprising CBC Outstanding Thesis Award announced at the CBC Brunch. My jaw dropped aghast with each letter of notification. None of this would have been possible without the support of the CBC Department, my professors, lab members, and friends at the UA. When I gave my speech at the College of Humanities Pre-commencement, I mentioned my gratitude to the CBC Department, my professors, lab members, and friends at the UA. When I gave my speech at the College of Humanities Pre-commencement, I mentioned my gratitude to all of these people for the support and guidance they provided me throughout my college career.

When the celebrations and ceremonies were over, I scrambled again to put together the BlastOff! Summer Camp with the Biochem Club. Meanwhile, other unpredicted events were dealt with and safely set aside. When the successful camp wrapped up, I once again prepared for a conference. At the end of July, I travelled to the Beckman Center in Irvine to present my work from the Cordes Lab as a Beckman Scholar and wrote an article for UBRP about that experience.

In 2011, all Espindola’s dedication and hard work paid off when she received the ACS-Hach Scholarship, which is for students who are pursuing careers as high school chemistry teachers. Being granted the scholarship has helped her immensely because it does not have to worry about financial needs. Thanks to the Chemistry and Biochemistry Department at the University of Arizona and the American Chemical Society, she has been able to accomplish many things while in college.

Aishan Shi

MCB Outstanding Senior 2013 and 2013 Biochemistry Outstanding Senior Thesis Award

After I came back from spring break, we had two weekends that were joyfully free of commitment. My friends and I went to the Botanical Gardens and held a cute Easter egg hunt in our backyard. It was the best way to celebrate and act like a kid again. Before I knew it, April set upon us, and I was dashing mad trying to finish everything in time: meeting with Katie in LS5 – bring Exam 1, Biochem club meeting, Grabación due by midnight, read Act III, finish poster by 5 pm!, UBRP update and review due, short biography due, amongst other things. The ASBMB Conference catalysed the last set of events in my college career.

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Shortly thereafter, I said my goodbyes to Tucson and arrived in Los Angeles to work for the non-profit writing and tutoring center 826LA for the year. Here, I have had the privilege of working with the seniors of several LA high schools in helping them craft their personal statements for college applications. In early November, we will be hosting our Great LA Personal Statement Weekend in which we partner 200 volunteers with 200 students to write and polish up these essays before they are submitted. More recently, I have also begun teaching GRE courses as an instructor for Kaplan. I look forward to continuing teaching and tutoring while I await my dreams for medical school.

Victor Arias

2013 UAHA Outstanding Senior Award, Robie Gold Medal, UA Senior Award 2013

Senior year was an exciting time for Victor Arias. Amidst applying for medical school and the regular hustle-bustle of classes, he worked in the research lab of Dr. Haurstah studying the binding equilibrium of the measles nucleocapsid’s binding protein. Additionally, he served as the co-director of Mortar Board senior honor society’s Clean Up Crew, organizing several UA clubs together to help clean up the community surrounding the campus. This project took months of planning, and the final result was a clean, beautiful Tucson.

On the weekends, he often shadowed and volunteered at Compass Alcohol and Drug Rehabilitation Clinic or served as a translator and aide at SEAHEC-KBI Migrant Aid Station in Nogales. These experiences exposed him to a side of medicine that cannot be taught in the classroom. Hands-on aid allowed him to interact with patients and truly get to know them. Working at these clinics further inspired him to pursue medicine.

Nonetheless, Victor still served the biochemistry program as well. He helped the Undergraduate Biochemistry Club prepare for the Biology, Engineering, and Chemistry Undergraduate (BECUR) Conference, and later, served as a camp counsellor and organiser of the BlastOff! Science Summer Camp for the second year in a row. As a result of his constant dedication to his community, Victor earned the UA Foundation’s Outstanding Senior Robie Medal and was recognized at the commencement ceremony. His service continued through the summer after graduation by working with Biochemistry Club and leading incoming freshman through orientation as a CBC Ambassador. Even now, as a medical student at USC’s Keck School of Medicine, Victor aims to help the community.

Eric Hansen

Goldwater Scholar and Astronaut Foundation Scholar 2013

Initially, I wanted to be a writer. Science had initially seemed vague, as I was being taught questions but a lot slower with real explanations. At some point or another, I realized that I might want to be a part of changing that perspective—where the teacher pushes students away from the subject they teach. I think my dad was pretty happy when I switched major to Chemistry. I never realized the creativity and reach that science so easily boasts until college, where I decided it was time to truly go after whatever I was interested, which turned out to be science.

A few years later, with a lot of failures and a few successes in between, I am graduating. A number of people have been integral to the awards and scholarships that I have won over that time so I will focus on them, rather than on the honors they helped to provide. For one, I have been a part of a great research team (both the Armstrong and Pember group), working to perfect parts of nanotechnology for photovoltaic applications. I was even fortunate enough to be given access to my own project with a number of other things. The ASBMB Conference catalysed the last set of events in my college career.

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Kayla joined Dr. Megan McEvoy's lab in 2010 where she studies the structure and function of metalloproteins in bacteria.

To learn more about the ARCS achievement awards for college scientists, visit ARCS.

Meet the Scholars

**Katherine Leight**
NSF Graduate Research Fellow
Katherine Leight has received the NSF Graduate Research Fellowship Program (GRFP) fellowship.

The GRFP program recognizes and supports outstanding graduate students in NSF-supported science, technology, engineering, and mathematics disciplines who are pursuing research-based master's and doctoral degrees.

Out of 13,000 submitted applications for the 2013 competition, 2,000 award offers have been made. A complete list of awardees can be found here.

Read the UANews Announcement: Katherine Leight is among 35 Wildcats Earning NSF Fellowships.

**Stephanie Tolbert**
American Association of University Women Award
Congratulations to CBC doctoral student, Stephanie Tolbert who has earned an American Association of University Women Award. Stephanie is working to reduce toxicity in cosmetics.

The national association announced that it has granted $3.7 million in 245 fellowships and grants to scholars and program across the nation. Stephanie is among nearly 80 women to earn the American Fellowship.

The full story is available on UANews.org.

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**Faculty Research**

**Craig Aspinwall and S. Scott Saavedra - “Electricity” sensors.**
Understanding the underlying chemical pathways that lead to disease states is critical for diagnosis, treatment and prevention. Detection of the unique chemical signatures that lead to normal and abnormal biological function is complicated by the diversity of chemical species coupled with the challenges of measuring very small amounts of material in complex samples. To overcome these challenges, and thereby facilitate new discovery and diagnostic applications, Professors Aspinwall and Saavedra in the Department of Chemistry and Biochemistry, in collaboration with researchers at Institute de Biologie Structurale in Grenoble, France, are designing novel, target-responsive nanosensors that are inserted into biologically-inspired polymer membranes developed at UA. The sensor platform relies upon the fusion of two types of critical proteins present in nearly all living organisms—ion channels and G-protein coupled receptors—to create new proteins with new functions, followed by insertion of the engineered proteins into a highly stable cell membrane mimic. The result is an innovative biosensor technology that yields a simple, sensitive and rapid readout for chemical sensors and diagnostic platforms.

**Matt Cordes - Metamorphic proteins.**
Metamorphic rocks result when one type of rock structure changes to another form, often over eons of time. It turns out that biological molecules called proteins, which carry out the functions of living cells, can also undergo metamorphism between different types of molecular structure, sometimes across eons of evolution and sometimes in less than a second. Remodeling the structure of a protein can allow a new form to evolve slowly or it can let proteins quickly shift back and forth between different tasks in the cell. Metamorphosis can also be dangerous, because some kinds of protein structure are toxic and contribute to neurodegenerative diseases like Alzheimer’s. Katie Stewart, a graduate student working in the laboratory of Matthew Cordes in the Chemistry and Biochemistry Department, has found that the same types of mutation that cause proteins to form toxic structures can sometimes also lead to a kaleidoscopic array of other structural changes. This behavior, which they call “polymorphism,” highlights the gauntlet of opportunity and danger that proteins may have to navigate as they evolve.

**Vanessa Huxter - Energy travel through diamonds.**
From the UANews story “Flawed Diamonds: Gems for New Technology” by Daniel Stolte:
A team of researchers led by University of Arizona assistant professor Vanessa Huxter has made the first detailed observation of how energy travels through diamonds that contain nitrogen-vacancy centers—defects in which two adjacent carbon atoms in the diamond’s crystal structure are replaced by a single nitrogen atom and an empty gap.

These “flaws” result in unexpected and attractive properties that have put such diamonds in the spotlight as promising candidates for a variety of technological advances.

The findings, published online in Nature Physics, could help scientists better understand the properties of these diamonds, which have potential applications ranging from quantum computing to the imaging of individual atoms in molecules...

Read the rest of the story at UANews, here.

**Katrina Miranda - Google grant.**
Professor Katrina Miranda was recently awarded a $50,000 grant to design a free online chemistry course for Google. The massive open online course...
Jeffrey Pyun - Plastic from waste sulfur.
A new chemical process can transform waste sulfur into a lightweight plastic that may improve batteries for electric cars, reports a University of Arizona-led team. The new plastic has other potential uses, including optical uses. "We’ve developed a new, simple and useful chemical process to convert sulfur into a useful plastic,” said lead researcher Jeffrey Pyun.

Pyun and his colleagues tried something new: transforming liquid sulfur into a useful plastic that eventually could be produced easily on an industrial scale. Sulfur poses technical challenges. It doesn’t easily form the stable long chains of molecules, known as polymers, needed to make a moldable plastic, and most materials don’t dissolve in sulfur.

Pyun and his colleagues identified the chemicals most likely to polymerize sulfur and girded themselves for the long process of testing those chemicals on their own. Even though the first experiment worked, the scientists needed to try other chemicals on their list to see if others worked better and to understand more about working with liquid sulfur. They’ve dubbed their process “inverse vulcanization” because it requires mostly sulfur with a small amount of an additive. Vulcanization is the chemical process that makes rubber more durable by adding a small amount of sulfur to rubber. The new plastic performs better in batteries than elemental sulfur, Pyun said, because batteries with cathodes made of elemental sulfur can be used and recharged only a limited number of times before they fail.

The new plastic has electrochemical properties superior to those of the elemental sulfur now used in Li-S batteries, the researchers report. The team’s batteries exhibited high specific capacity (823 mAh/g at 100 cycles) and enhanced capacity retention. Several companies have expressed interest in the new plastic and the new battery, Pyun said.

The team’s next step is comparing properties of the new plastic to existing plastics and exploring other practical applications such as photonics for the new plastic.

By observing electrons in real-time over a few milliseconds of a billionth of a second, physicists have been able to demonstrate that organic molecules interact with the magnetic electrode in so-called spintronic devices, opening the possibility of manufacturing such data storage devices from cheaper, carbon-based materials instead of metals and silicon.

The drive toward more powerful, faster and smaller computer and telecommunication devices has kept scientists busy for quite a while, with considerable advances made over the last few years. For example, the rapid turn-on time of modern computers is made possible by the recent development of magnetic memory, or MRAM.

Traditional ways of accessing data quickly are based on the manipulation of electric charges, which works only while a computer is powered up. MRAMs on the other hand use magnetic storage elements, delivering high-speed, non-volatile memory.

Oliver Monti - New understanding of organic semiconductors.
By measuring electric currents in the presence of a magnetic field, data can be written as “0” or “1.” All currently commercially available MRAMs are based on inorganic materials such as metals.
and silicon and take advantage of an effect called giant magnetoresistance, or GMR. Oliver Monti, an associate professor in the University of Arizona department of chemistry and biochemistry and a co-author on this study, explained how GMR works: "Electrons have a unique property that we call spin. In a sense, they behave like tiny magnets that can have one of two orientations relative to a surrounding magnetic field: north pole up or north pole down."

When an electric current is applied, one orientation leads to high resistance – and thus small current – while the other lowers resistance, allowing for a larger current. “Up or down ultimately translate to a 0 or a 1, giving each electron a digital identity that can be used to encode and store information,” Monti said. The science behind this technique, known as spintronics, recently has been applied to semiconductors made of organic molecules.

The advantages of organic semiconductors are overwhelming. They can be manufactured cheaply since they largely consist of carbon, which unlike inorganic semiconductors can be processed at relatively low temperatures. Moreover, organic materials are more malleable to the standard tools of chemical synthesis, and researchers can create lightweight and flexible thin film structures that can be integrated into a variety of different devices. First implementations of organic semiconductor-based spintronics elements have already been demonstrated in laboratory settings. “Inorganic materials often require very low temperatures for operation, which makes them impractical for commercial applications,” Monti explained. “Organic spintronics might relieve that issue.”

While it is well understood how data bits of 0 and 1 can be achieved with traditional GMR devices, the critical question of how magnetic information is transferred between magnetic electrode and the organic material still poses a significant puzzle. A collaboration between Monti and researchers in the group of Martin Aeschlimann at the University of Kaiserslautern in Germany has now made a significant step toward resolving this question. Using ultrafast, time-resolved measurements probing the interface between an organic semiconductor and a magnetic metal, the team was able to show how electrons magnetized in one particular direction remain trapped in the molecules for substantially longer times than those with opposite direction.

The results, measured by observing electrons in real-time over a few millionths of a billionth of a second, demonstrate that the molecules interact with the magnetic electrode in a spin-dependent way, Monti explained. “This so-called spin-filter effect is ultimately responsible for the magnitude of the current and thus determines whether a 0 or a 1 is being read.”

According to Monti, this understanding provides an avenue for the rational design of highly efficient organic spintronic devices. Efforts are now under way to make spintronic devices cheaper and more flexible by introducing a new class of materials, the so-called organics semiconductors. These materials are already used in light-emitting diodes to form the basis of the very bright, color-intense and lightweight and flexible thin film structures that can be integrated into a variety of different devices. First implementations of organic semiconductors made of organic molecules.

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Welcome New Staff Members

Olivia Bernal, Accountant Associate - Business Office - I am a First-born, Capricorn/Sagittarius, Disney fanatic, who enjoys traveling, brownies, and “All Things Considered.” I see the glass half full, even though I am near-sighted. I love spending time with my family, being alone, and being alone around other people. I look forward to my time here at UA, and hope to be part of the football team when I turn 40.

Jane Dugas, Program Coordinator for Seminars - After retiring in 2010 following 25 years at the UA, I felt fortunate to return to CBC in my former position working with seminars. The highlight of my hiatus was a wonderful cruise to Alaska with my daughter. Some of my past employment history includes Allied Chemical in NYC, Up With People, and IBM. It’s good to be back! Got seminars?

Martin Marquez II, Undergraduate Academic Advisor – Advisory Office – Teaching middle school science and high school biology for seven years, has been a rewarding experience. However, my plans have always been to return to Tucson and work within the UA (Wildcat for LIFE). I learned a BS in Ecology and Evolutionary Biology from UA and a M.Ed in Educational Administration and Supervision from ASU. I enjoy spending time with my wife and three daughters, playing sports, and reading. I feel very lucky to be a member of the CBC department and community. I plan on working with faculty, staff, and students in continuing our department’s success.

Jason Parish, Accountant Associate – Business Office - Due to my father being in the Air Force, I got the opportunity to experience a lot of different places. I was born in England and grew up in Hawaii, where I lived for over 15 years. I ended up in Tucson as the result of my father retiring from the military. After adjusting to the oven-like heat, I attended the U of A and finally graduated in December 2012. I enjoy participating in any competitive activity or sport. I have been skydiving and bungee jumping, so I guess I’m a little bit of an adrenaline junkie as well.

Sean Davis, Accountant Associate – Business Office - I ventured out to Arizona for school in the fall of 2009, leaving the comfort of my friends and family in the suburbs of Boston. After a brief period of culture shock, I settled into Tucson and fell in love with the area. I graduated from the U of A in May of 2013 and started working at CBC shortly after. When I’m not working here, I enjoy taking trips outside of the city to places like Tombstone, Mount Lemmon, and the Salt River with my friends.
Research Study Abroad
Jonathan Ferng - Peru

Last summer, I had the privilege of spending six weeks in Peru in the Healthyouth program, which is dedicated to improving the well-being of youth and communities. My first few days were spent exploring the parks and corner stores of Lima, feasting on empanadas (stuffed pastries), and surfing at the beach. There were a total of 23 volunteers from the UA, ASU, U of Illinois, and Yale. By the time we left for Huancayo, a rural city in the highlands of Peru, we had already become a close-knit group.

My home in Huancayo was affectionately known as ‘La Casa de Naranja’ for its orange exterior. My host mother and her two children, both young adults like we were, made me feel welcome at once. Even though my Spanish-speaking ability was limited, I willingly made mistakes and rapidly improved as a result. Some volunteers chose to teach English to elementary or middle school students for five weeks while the majority of us spread out among five different clinics within driving distance from Huancayo. My main clinic was in Pilcomayo, where I shadowed obstetricians as they checked up on patients and went on wellness campaigns in the countryside. Each week, I shadowed or worked with a different physician, ranging from general doctors prescribing medications and giving stitches to oncologists who would diagnose and surgically remove tumors from patients. When working with nurses, I helped to fill out patient check-up forms and measure the weights and heights of babies. I remember going with a doctor to an elementary school one day to help teach children about good hygiene habits and getting swarmed by requests for autographs after the presentation. Not a day passed when I was not greeted by whispers or exclamations of ‘chinito’ (Asian), which I found amusing and eye-opening. ‘Gringos’ or foreigners, seldom visit Huancayo and I was glad to be able to leave a positive impression through our volunteer work.

We also took turns visiting kids in an after-school program to tutor them in math and Spanish. After the students completed their homework, we drew, colored, and played games with them, such as the Peruvian version of freeze tag called ‘Cemontos y Aguas.’ I still remember how excited they were after figuring out a division problem or receiving crayon drawings of unicorns. On weekends, we drove and hiked through an amazing variety of jungles, valleys, and glaciers. We took advantage of long bus rides to share our interests and values with each other in depth… and to break out into spirited sing-alongs. At night, we entertained each other and the natives with our dance moves at discotecas or our singing skills at karaoke bars. When working with nurses, I helped to fill out patient check-up forms and measure the weights and heights of babies. I remember going with a doctor to an elementary school one day to help teach children about good hygiene habits and getting swarmed by requests for autographs after the presentation. Not a day passed when I was not greeted by whispers or exclamations of ‘chinito’ (Asian), which I found amusing and eye-opening. ‘Gringos’ or foreigners, seldom visit Huancayo and I was glad to be able to leave a positive impression through our volunteer work.

My last week in Peru was spent exploring Cusco, zip-lining, mountain biking, rafting, and hiking to Macchu Picchu with my housemates. Macchu Picchu was breathtaking and to break out into spirited sing-alongs. At night, we entertained each other and the natives with our dance moves at discotecas or our singing skills at karaoke bars. My last week in Peru was spent exploring Cusco, zip-lining, mountain biking, rafting, and hiking to Macchu Picchu with my housemates. Macchu Picchu was breathtaking and sound, sights, history, art, religion, and everything going on around me. Much to the feeling I had waking up every morning thinking, “I can not believe I am in Italy.”

As a science major I have been taught to observe, test, analyze, and form a conclusion. In Italy I observed the people, food, sound, sight, history, art, religion, and everything going on around me. I tried new foods such as pasta with liver and chili sauce. I tested my skill of speaking Italian to the Italians (not thanks to Eli and Neto, our loving Peruvian parents who opened up their homes and hearts to us, Michelle Mendez for coordinating our trip and making sure we all got home safely, and my fellow volunteers for their goodwill and friendship.

Summer Gardner - Italy
My decision to study abroad was spontaneous and short noticed. I decided in January that I wanted to study abroad in Italy that upcoming May. I had not saved up any money, shocked my family, and was one of the last to submit their applications. However this did not stop me! I found the perfect program from me, Arizona in Italy.

The program entailed studying abroad in Orvieto, Italy along with different trips planned in the five weeks that I would be in Italy. At first I didn’t have hope that I would be able to come up with the money to go this summer. And as the due date for the application into the program, application for financial aid/ scholarships, plane ticket due, and finally taking off to Italy!

With each deadline coming and going I had a bubbling sensation growing inside of me, this is really happening. I like to call myself a free spirit and with this opportunity becoming more and more close I was getting antsy.

School was over and I had one week to endure before I was on my first plane to Orvieto, Italy. Part of me was scared and the other half couldn’t wait to get out of Tucson, AZ! As my family drove me to the airport and wished me luck and said goodbye is probably when it hit me that I was going to another country! The only obstacle that was in my way, this time, was two transfers one in Chicago and one in London. This was my first time since I was 6 that I had been on a plane; so flying was a new experience for me as well. Alas I made it to Italy!

Italy was everything I had hoped it would be. The views were magnificent, the sounds purer, the smell sweeter with a twist of sour, the touch of the wind cleaner, and the taste of food grown in front of my eyes delectable. Orvieto is considered “old” Italy; it is not as modern, or as traveled by tourists, as Rome or Florence. The architecture is that from old movies; they still have cobble stone streets, which was the cherry on top of my experience. I poured my heart and soul into this experience and made it everything I wanted it to be from: cliff diving into the Mediterranean Sea in Sorrento, the art Biennale in Venice (the city on water), the on going rivalry Siena has for Florence, the magnificent statues with water glazing the sides in Tivoli, to the feeling I had waking up every morning thinking, “I can not believe I am in Italy.”

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Eric Hansen - Northwestern University

I was fortunate enough to apply for and receive an REU (Research Experience for Undergraduates) in the Materials Science and Engineering Department at Northwestern University this summer. Northwestern is not only a prestigious university with great funding and top scientists, but it is also located in beautiful Evanston, Illinois. The university is literally built on Lake Michigan, complete with green trees and a great view of downtown Chicago over the lake.

I worked with Dr. Scott Barnett, a leader in solid oxide fuel cells (SOFCs). A SOFC works with carbon-based fuels or hydrogen gas, which it then catalytically breaks down while converting the released chemical energy into an electrical current. SOFCs work at high temperatures (600 - 800ºC), which is required to reduce electrical resistances in the cells. My specific role in the research was utilizing a sol-gel synthesis, in which metal ions are tethered together using organic-linking molecules, in order to create a high surface area material. This higher surface area was intended to improve the number of reaction sites for the fuel cell, thereby increasing the amount of power delivered. I learned a number of new instrumental techniques, methods for production of fuel cells, and even a bit about electrochemical testing.

Despite some frustrations in transitioning research environments, I drew a great deal of knowledge for an experience of only 9 weeks while making strides in research that might soon be impactful.

Sophie Hapak - Europe

I received a BRAVO! grant for the summer of 2013, and when I was asked to write an article for the magazine, I was skeptical. A summary to incorporate everything I learned this summer about science, new cultures, and life in general? In my opinion, effectively comparing and contrasting my life in Arizona with my trip to Europe cannot be accomplished in anything shorter than a novel. But I’ll do my best.

To start, this trip was truly exceptional in terms of the science. Working in Dr. Philipp Selenko’s lab means learning in-cell (or in-lysate) NMR. This method is relatively new in the field of structural biology, and works great when the aim is to study post-translational modifications in a time-resolved fashion. It was the perfect extension of my project in Arizona, where I helped characterize the biochemical interactions of the aPKC isoforms and Par3 in the context of axonogenesis, or the growth of an axon in a newly born neuron. The finding that one neuronal aPKC protein interacting with Par3 leads to an axon while another interaction with a different aPKC isoform will lead to dendrites led us to pose the question: do the phosphorylation capacities of the aPKCs differ? A summer of work in Dr. Selenko’s lab has revealed that indeed, yes, these two proteins phosphorylate their physiological substrate, KIBRA, with different rates. The implications of this finding in terms of neuronal polarity (as well as potentially other types of polarity) are exciting, and I think that both labs are pleasantly surprised and pleased with the success of this small summer project.

But this trip for me was much more than working in a lab. One of the highlights of my time in Europe was attending a biophysical chemistry course in Erice, Sicily. Here, I learned the theories behind many structural biology methods, including computational biology, X-ray crystallography, and NMR. Between classes, I had time to fall in love with Italy, as well as visit ancient ruins and, of course, the beach. I made a lot of friends, some of whom I visited after the meeting. Because of this course, I had an excuse to travel to Zurich and London. I wrote the first part of this magazine article on a plane ride to Rome. One year ago, I never imagined myself doing what I’m doing right now, and I’m not referring to the working-in-a-foreign-lab part. In Europe, I’ve encountered a stereotype about Americans, and that is that we don’t travel beyond America very much. And, at least in my case, this stereotype was correct. The only other country that I had visited outside of the United States before this summer was Mexico, and even that can be attributed mostly to proximity. I was born in Arizona, grew up in Arizona, and went to college in Arizona, so the idea that I would one day have the opportunity to explore Europe never really crossed my mind.

And even if it had, the prospect of traveling by myself would have been a little frightening. Because of BRAVO!, I have not only been able to crush the stereotype of Americans not being too keen on traveling (at least when it comes to this American), but also I have returned home with an increased sense of confidence in my ability to overcome entirely new challenges, no matter how foreign they may be.

As with anything worthwhile in life, this trip has not been without its difficulties. Along with battling the occasional bout of homesickness, I’ve had to learn how to adapt to a place where English is not the main language and supermarkets are not open on Sundays. I was at a grocery store in Berlin for the first time one day and, after paying for my things, I looked up at the cashier expectantly as my things remained unbagged. But the cashier had already forgotten about me and had moved on to the next customer. Experiences such as these are more embarrassing than anything else, and they have happened to me all too often since I’ve been abroad. I ended up getting

Online Extras

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Unlike the clubs in American universities which just meet every so often, Japanese clubs were not what I had expected! I had expected them to be much more serious, but they are for people with common interests to hang out every day. So, all people makes their friends after coming to university. I thought that it would be the perfect way for me to improve my Japanese, so I went and joined two clubs, the English conversation Group and the English Speaking Society. Now with these names, you'd think the members would be fluent in English. Not at all. They were clubs for people with interests in English, though not necessarily to learn it. And this ended up being the best thing that could happen to me in Japan. My biggest improvement in Japanese was definitely due to the friends I made in these clubs.

Almost every day we would have some kind of crazy event. Sometimes we would have a barbeque standing in the middle of shallow river, camp up in the mountains of Japan, bowl for the whole night, explore the city, and even have sports competitions with other universities! My favorite part was definitely the camping though. The ECG and I took a two hour road trip up to what seemed to be the middle of nowhere north of Tokyo. After driving up several winding mountain roads, we arrived at a small campsite run by an old Japanese man. The biggest surprise was that we had the entire campsite to ourselves. This included several cabins, a large bonfire pit, and the best part, a large river. We could be as crazy as we wanted to. So, our days involved swimming in the river, catching fish with our bare hands, and hiking, while our evening involved shooting off fireworks, ghost stories around huge bonfires, and roasting our daily catches. By the end of the trip, everyone was exhausted. The trip back was dead silent, as everyone slept the whole ride back.

Aside from the wilderness, I also had many chances to go downtown with my friends. Downtown Tokyo was amazing, with so much to do. If we were able to wake up early enough, we would all go to Tsukiji, the famous fish market off Tokyo Bay. All the shops there would sell you pieces of a fish that was caught just a couple hours earlier. Since then, any other sushi just isn’t the same. If we couldn’t be bothered to wake up early, we would often go to Odaiba, an artificial island filled with several malls and other attractions. Upon arriving in Odaiba, a huge, multistory Ferris wheel confronts you. And surrounding that Ferris wheel are several malls, each containing strange attractions. For example, one mall contained a huge indoor theme park, with roller-coasters and all. Another mall, would have you enter through a large cave that would exit onto the streets of Italy which would lead to pre-war Japan, only to have you exit the mall confronting a smaller scale replica of the Statue of Liberty. I was worried I’d lose track of which country I was in.

The clubs were not what I had expected! I had expected them to be much more serious, but they are for people with common interests to hang out every day. So, all of this constant immersion with my Japanese friends was, of course a fun part of the experience, but also the most important catalyst for helping me learn Japanese.

Though I wasn’t able to do anything science related during my stay, I will never forget about my experiences in Japan. In fact, it just gives me more drive to shoot for graduate school in Japan. At least, I know that if I could conquer something like that, I should have no problem in the sciences, right?
Shaina Hasan - Singapore “It Was Great!”

In these past few days since I’ve returned from Singapore, all of my friends have been asking me how my trip was, I can only reply with a, “It was great!” One person scoffed at my simple answer and asked, “Only great? Nothing else?” The problem is, I can’t explain just how wonderfully fantastic and enlightening this entire experience was for me without taking several hours to properly communicate what an impact this past summer has had on my entire outlook on life, so I decided to keep it simple and sum it up with the most proper (but unfortunately most overused) word possible: GREAT.

Funded by the BRAVO! grant, I was sent to Singapore to work in the lab of Dr. Vinay Tergaonkar at the Institute of Molecular and Cell Biology (IMCB) for three months to determine if there was a possible interaction between the proteins atypical PKC and NFκB. This would implicate a different mechanism for cancer development in certain epithelial tissues, leading to possible therapeutic treatments targeting these two proteins in order to enhance survival and success rates in the cancers they contribute to. The lab I work in at the University of Arizona, which is the lab of Dr. Sourav Ghosh in Cellular and Molecular Medicine, is interested in the different signaling pathways the kinase atypical PKC contributes to, including its role in cancer development. Dr. Vinay Tergaonkar’s lab is interested in the deregulation of the NFκB signaling pathway in cancer, a signaling pathway that is involved in stimulating an immune response in cells by causing transcription of certain inflammatory genes. The possible connection between these two proteins—like if one regulates the other—has not been completely understood, which I was attempting to investigate this past summer. Through the implementation of several different molecular and biochemical assays—nuclear/cytosolic fractionation, westerns, EMSA, and gene expression—we have found that certain isoforms of aPKC may regulate some of NFκB’s target genes, but possibly through a different molecular mechanism that does not interact with the NFκB pathway.

During this past summer, I was trained to perform techniques that I had never done before in order to acquire the data required of this project, and even though that was an incredible learning experience in itself, I had learned even more about the nature of scientific research and what a research-oriented career is like by looking through the lens of the ten postdoctoral researchers and two graduate students coming from eight different countries all over the world. Singapore is truly an international hub, which was reflected in my own lab, and I had the wonderful opportunity to interact with a huge variety of scientists who all had their own experiences with research and were able to provide me with a holistic understanding of what it is to be a scientist.

Alongside the scientific aspect of my adventures in Singapore, I was floored by the astonishing uniqueness of the culture found in this city. Yes, the country is incredi-
I arrived in Italy in the evening, but I did not want to stay the night in Rome with all my bags. So, I quickly hopped on the first bus to the train station and took one of the late night trains into Orvieto. I was amazed at the people who got to Orvieto that did not speak Italian. It was the only thing that got me to the right platform on time with the right ticket. Orvieto is not a final destination, but a stop, and it was difficult to figure out the train station while watching my bags and trying to make it on time. However, I quickly got the hang of the whole train thing. I arrived in Orvieto and was whisked to my apartment for the next few weeks. However, I did not really feel like I was in Italy yet. This changed the next morning when I explored the town with my roommates. I found the most breathtaking view and suddenly I felt like I was in Italy and I was home.

I was the only one in my apartment that spoke Italian. So, I helped out my roommates ordering and communicating. Sometimes people would give me free food and compliment me on my Italian, which made me feel like I was actually able to apply my knowledge of the language in a real life situation. My language might not have always been perfect, but I was always able to be understood.

We went on many field trips around Italy and it was more beautiful than pictures could describe. Every place was different and rich with culture. For those of you who do not know much about Italy it is divided into regions. People identify more with their region than with Italy as a whole. Every region is different and has a lot to offer. I got to explore Orvieto and its underground where they used to breed pigeons. I explored Rome and saw a church made out of bones. I fulfilled a lifelong dream of going to a soccer game in Europe as I am a huge soccer fan.

My birthday was during my time in Italy. My landlords were so hospitable that they gave me the famous dessert of the region for my birthday along with some beautiful flowers. Italians are very friendly!!!! I visited many places on field trips and with friends including Siena, Florence, Rome, Napoli, Pompeii, Paestum, Tivoli, Pisa, Sorrento and Tarquinia. I went spelunking in a cave, had fun at an Italian carnival (not nearly as strict as America let me tell you) “knocked over” the leaning tower of Pisa, explored amazing fountains in the Villa d’Este, saw Hadrian’s Villa, went cliff jumping in Sorrento, saw many ruins, museums, got to know the people in my little town, and made many friends in the program. I watched soccer (calcio in Italian) games with Italians, tried new foods including Boar and Pigeon, and had the best pizza known to mankind. I rode a gondola in Venice and I did not want to come back home. I fulfilled so many life dreams in Italy and followed this trip up with backpacking through Spain, France, Holland, Germany, Austria, and Switzerland. This summer changed my life and so did the people in it. Study abroad can teach you about yourself as a person, challenge you with different barriers and limits, and help you to create strong friendships around the globe. It is a rewarding experience and I encourage anyone that has the opportunity to study or volunteer abroad to take it and enjoy every minute. You will not want to come home.

Aileen Leyva - Peru

This summer I spent 5 weeks in the picturesque country of Peru with the non-profit organization Vive Perú. Vive Perú fosters the understanding of Latin American culture and provides much needed aid to Peruvian communities through many ways depending on your interests. Aid is provided through medical campaigns, volunteering at hospitals that are understaffed, health education campaigns, English workshops, music enrichment programs and Internet installation projects. Having done a study abroad program before I thought I would embark on a volunteer adventure. My first week in Peru was probably the same as any other tourist who visits Peru. I went to Lima, Cusco and Machu Picchu along with other volunteers who came from all around the country (Stanford, Berkeley, Notre Dame, ASU, U of A, among others). Machu Picchu was breathtaking. From there I traveled to the city of Trujillo, La Libertad, Peru that would be my home for the next 4 weeks. Thinking back I still can’t believe all the things that happened in only 4 weeks. Every day was an adventure. My weekdays consisted of volunteering in hospitals in impoverished areas. I got to shadow a pediatrician, gynecologist, ER doctor and at times get to do triage, physical exams, vaccines and insertions. One of the things that I will never forget was the day I got to scrub in for a brain tumor removal. It was one of the most amazing experiences of my life. I definitely would not have been able to do many of the things I got to do in Peru but there is no comparison between our hospitals here in the U.S. and theirs. It was really sad to see the state of some of these facilities and working in these hospitals made me appreciate everything we have back home that we take for granted most of the time. We also worked with families in impoverished areas of Trujillo, specifically El Progreso. We gave classes and workshops to both the children and parents on general health, hygiene and prevention. I can honestly say that the kids from El Progreso have forever changed me. I know that sounds cliché but I will never forget their happiness and how loving they were to complete strangers like me. They are honestly the happiest kids I have ever met. It still seems unreal to me how happy they are living in the conditions that they do. Their streets are filled with garbage, most of their homes consist of dirt floors, clean water is a luxury for them, 8 out of 10 kids are infected with parasites amongst other diseases and most of their parents did not even get to finish elementary school. It is still unreal to me how there are still people around the world who live like this. I found their smiles and innocence contagious and I couldn’t help but lose myself among other diseases and most of their parents did not even get to finish elementary school. It is still unreal to me how there are still people around the world who live like this. I found their smiles and innocence contagious and I couldn’t help but lose myself
in their little world where all that mattered was that they had someone to play with and hug. I got to meet amazing people who I now consider my best friends, got to travel around Peru and immerse myself in their culture, and hopefully made a difference in a few people’s lives. It was not always easy but it was definitely one of the most rewarding summers of my life.

**Burke Liepmann - Harvard Medical School**

For a little over three months I was fortunate enough to have an internship at Harvard Medical School. I worked for the Scheiepen’s Eye Research Institute in the Lab of Michael Young. His lab only specializes in the retina, having two key goals in mind, first being retinal neural protection, and the second being retinal regeneration. I was given a project that dealt with retinal regeneration, but got a firm understanding of the protection side through observation and helping some of my coworkers. The research in this lab is on the cutting edge of technology because they work heavily in stem cells and have literally any resource available to them.

My project dealt solely with human retinal progenitor cells, which are simply cells that are on the verge of making their final developmental decision on what they will differentiate into. My goal was to take these cells and treat them with a chemical called DAPT and provide a suitable culture environment as an increase in the differentiation of photoreceptor cells and a decrease in the proliferation. The big picture goal for a successful outcome of this project would be to transplant these differentiated cells into the ocular tissue of a patient who had dead or damaged photoreceptors. Theoretically these transplanted cells would stimulate the growth of new photoreceptors and eventually help the patient restore vision. Obviously there is a lot more that goes into the big picture goal, but I felt like I got to take part in a small piece of it with my contributions with the use of the chemical DAPT. At the end of the summer I had successfully achieved my goals seeing an increase in differentiation and a decrease in proliferation. My methodology consisted of a number of techniques including flow cytometry, RT-PCR, fluorescence microscopy, and cell culture. Even though I got good results, I wish I would have had some more time to try other methods and make new discoveries.

I really enjoyed working in the lab. The post docs I worked for were brilliant for one, and they were all very helpful in mentoring me and giving me confidence to further my academic goals in science and medicine. The one thing I appreciate that they did was give me the independence to explore any avenue regarding my project. They let me try new things and valued my opinion when it came to moving the project forward. They threw me right in the fire and really made me stretch to better my knowledge and understanding stem cell research. I spent a lot of time in the lab, usually around ten hours a day, sometimes the occasional really late night, but it was well worth it.

Not only was the lab a fantastic experience, living in Boston was equally amazing. It is a vibrant city full of young people that likewise have similar goals whether it be in science or business or anything for that matter. I was told there are something like over 200 colleges in the greater Boston area and half of the population of the city are all students. SO there are a lot of people you can relate to. The social life and history of the city has got to be number one in the country for me, but maybe I’m a little biased. I really enjoyed going to Boston, not knowing a single person. For me it was a great way to find myself and truly solidify future goals. It got me right out of my comfort zone and challenged me in so many ways, and I feel like when that happens, a lot of self progression takes place and you come out of the experience a better person. I would definitely recommend doing something similar for anyone who has an opportunity to do so.

**Estefania Lopez - Costa Rica**

This summer I was privileged with the opportunity to participate in the Global Media cuts Spanish Language in Healthcare Program in Costa Rica, which is organized by UA Medical students through the College of Medicine. Our daily schedule involved waking up at 5am to be ready at the bus stop at 6am to be at a clinic at 6:30am to work alongside a doctor, as a doctor myself! Lunch was from 12-1pm, we had a medical Spanish class from 1-4pm and ran to the bus to be home for dinner time with our host family around 5-6pm. Dr. Sergio Leon was my paired doctor at the Clinica Bíblica in the country San Sebastian in San José the capital. He taught me basic procedures checking the heart, lungs, ears, nose, mouth of patients, among other medical jobs, but he also demonstrated what a really dedicated doctor he is through actions.

He taught me that caring about your patients and taking the time to listen and work with them to improve their lifestyle, building a trusting patient-doctor relationship was just as important as the medicine itself. Any procedure such as laboratory results, pap smears, ultrasounds, x-rays, etc. take at least 2 months to process, and even worse, surgeries such as an appendectomy are scheduled within 2 years! I truly admire him because of this and his ability to clinically diagnose a patient without having immediate data and his truthful quality medical care being also a friend to the patients and myself. I was pleasantly surprised to be able to employ every day’s medical Spanish teachings at the clinic, because we covered many topics such as the vascular diseases, cardiac problems, neurological, dermatological, and respiratory systems, etc. Being called a doctor while living in a foreign country felt so amazing because the Costa-Rican people are very welcoming and humble and they allowed me to not only experience being a doctor, but also learn about their culture, customs and hardships. This made me grow as a person and alter my perspective tremendously. The lifestyle that we carry in the US is not even close to how life is in Costa Rica. There is no custom to have AC in houses, or clothes drying machines, doors are left open for air to circulate and for neighbors to visit, fruit all day everyday is a must as well as other healthy habits like waking up early and eating food that is not deep fried or fattening. There is no rush to their life, and what I mean by that is that here in the US, we are all about appointments and rushing to fit too many things into one day, life flies by here, where on the contrary, there...
although people are still punctual, there is a peace and tranquility to each day, not this rush to leave the house at the crack of dawn without breakfast and all stressed out. Words cannot describe the beauty of this country, everywhere we travelled to on a bus or taxi, whether it be a beach, volcano or local area, we would always have an amazing scenery with all types of trees, exotic flowers, and a variety of animals. Despite the hair troubles with the humidity of this tropical country, I loved every place we visited and how as a country they are very conscious of their carbon footprint and have declared that they will become the first carbon-neutral country by the year 2021. In order to achieve their goals they have many self-sustaining techniques in use like crop rotation, natural pesticides and the decreased use of electricity as well as have employed many laws protecting the biodiversity they have. My adventure in Costa Rica lasted 5 weeks and I would definitely return if I have the chance, there are endless stories I could share but living through the experience was definitely the best part.

**Desiree Morris - Brazil**

From childhood I’ve always had an extreme fascination with the South American continent. It’s tropical climate, vast expanses of forestry, limitless variety of species and rich culture has always been alluring and mysterious. During my freshman year of college as a Biochemistry student this sentiment drove me to explore a second degree in Spanish with a Portuguese concentration. Through Portuguese studies at the University of Arizona, I was able to Study Abroad this summer in Fortaleza, Ceará, Brazil and I must say that my life has been altered substantially.

Whilst studying the Portuguese language and improving my verbal and oratory proficiency, I was able to fully immerse myself in the culture and live the Brazilian jeito de vida (way of life). Although the teaching experience flowed through the classroom, I felt that the true learning experience came from the day-to-day activities and emersion into Brazilian society. I had the opportunity to not only live with a Brazilian family, but to be part of the Carvolho household in every aspect. Amongst many other activities, I travelled to pristine beaches with white sand and crystal clear water, explored historic museums, devoured Brazilian Churrasco (BBQ), and participated in one of Fortaleza’s largest music festivals, Festival.

For me study abroad was exactly what the title entails, broadening my horizons. I returned to the university with more than I left with. I gained insight on the dynamics of the country, friends and family both from the program and Brazil, and most importantly a deeper understanding of the world outside of the United States. This experience vitalized my passion to improve the lives of others globally and is one that I would recommend to all students.

**Nickie Seto - Japan “A Once in a Lifetime Chance”**

“Ichi-go, ichi-e.” In English, the Japanese phrase roughly translates to “a once in a lifetime chance.” This past summer, the U of A’s BRAVO! Program gave me a once in a lifetime chance: to meet new people, explore a foreign country, experience a new culture, and collaborate with researchers on the other side of the world. Funded by an NIH grant through the Biomedical Research Abroad: Vistas Open! Program (BRAV0), a fellow student, Brianna Rico, and I traveled to Tokyo Metropolitan University located in Hachioji, Tokyo, Japan to research the distribution of polyphenols in sawtooth oak leaves (Quercus acutissima) through a research connection with colleagues of our UBRP mentor, Dr. John Koprowski, Professor of Wildlife Conservation & Management.

We worked with Dr. Noriko Tamura and her research group at the Tama Science Forest Garden, an experimental forest on Mt. Takao. They noticed that in certain tree species like the sawtooth oak (Quercus acutissima), the Japanese giant flying squirrel (Petaurista leucogenys) selected for only certain sections of a leaf, leaving feeding remains that appeared as if a quarter sized hole was punched out of the center of every leaf. Dr. Tamura, along with Dr. Fumio Hayashi from the Animal Ecology laboratory of the Tokyo Metropolitan University, hypothesized that the giant flying squirrels were selecting for low polyphenol concentrations in certain sections of the leaves.

Polyphenols are a family of compounds characterized by their numerous phenol groups. Ubiquitous in plants, these compounds contribute to plant properties such as color, resilience, and defense. One group of polyphenols in particular, tannins, act as a defense mechanism against predation by causing a bitter taste and precipitating digestive proteins, resulting in digestive complications in many mammals, including humans. Doctors Hayashi and Tamura believe that the giant flying squirrels were avoiding the peripheral portions of the leaves because of the adverse side effects caused by phenols.

Our research involved a combination of field work and lab work. Every Monday, we collected eaten and whole leaves from the Tama Science Forest Garden as well as other field sites around Mt. Takao. Field sites ranged from a park to a narrow trail above a steep precipice. The rest of the week, we brought the leaves back to the lab at Tokyo Metropolitan University to perform extraction and analysis of polyphenols.

The combination of field work and lab work proved to be doubly challenging. For example, we rarely observed any squirrels feeding. not only are the flying squirrels nocturnal, the trees were over 30 feet high. In lab, we also had to consider another factor: time. We had to determine if the polyphenols in our leaves degraded over time, and whether transportation and storage time would affect our experiment. Despite these difficulties, we managed to collect preliminary results that showed a higher polyphenol concentration in the peripheral sections of the Quercus acutissima leaves.
Many plant chemistry research use insects as a model because of their precision in their selection of chemicals. We rarely find mammals that exhibit such precise feeding selection, selecting even within sections of a leaf. Observing the giant flying squirrel physiology. We hope to identify the phenols that contribute directly to this feeding behavior. Additionally, the tree species of this study, *Quercus acutissima*, have been used in traditional Asian medicine as an antidiuretic. Identifying polyphenols in the leaves of this species may also have some future human health implications.

My time in Japan was not completely spent on research. On the weekends, we took advantage of the expansive train and subway system and toured Japan. In Yokohama, Tokyo, we visited the Pokémon Center. In Akihabara, we ate in our first maid café. In Harajuku, we saw many street fashions as well as cosplay. The highlight of our summer was conquering Mt. Fuji and watching the clouds part to reveal a beautiful sunrise at the peak. Afterwards, we soaked our sore muscles in a hot spring at the base of the mountain and slept the entire bus ride back.

When I look back on my research in Japan, I realize that I was able to partake in a wonderful, unique experience. In addition to learning about the feeding behaviors of the Japanese giant flying squirrel, I discovered that international collaboration is amazing. There was much for me to learn and much for me to share with the researchers at Tokyo Metropolitan University. The students enjoyed our stories on Arizona wildlife like scorpions, horned lizards, and tortoises, which are not seen in Japan. On the other hand, I was able to see wildlife that I have never seen back in Arizona, such as the red face of the Japanese raccoon dog, Japanese mountain leeches preying on a giant earthworm, and great blobs of frog eggs in sticky, white sacks hanging from trees.

In addition, every Tuesday, we met in the Animal Ecology laboratory to share research progress, to socialize, and to eat and drink. These gatherings became our headquarters – we asked questions about the customs we did not understand and ate cake together. They asked us about life in the States like how big the streets were and what happens if you are stung by a scorpion. And if a language barrier ever arose, we would turn to whiteboard Pictionary.

Even though we spoke a different language, our mutual fascination with science helped us understand each other. And of course, happy hour is universal.

University of Arizona UAN Chapter Hosts Its Fourth BECUR Conference

The University of Arizona UAN Chapter hosted the fourth Biochemistry, Engineering, and Chemistry Undergraduate Research Conference (BECUR) on February 23, 2013. Approximately thirty five UA and Arizona State University students presented posters along with six Tucson area high school students. There were also 2 undergraduate speakers, Wesley Cai and Jaclyn Harper; Wesley talked about his work on GSK-3β-induced proteasomal degradation of Cyclin D1, while Jaclyn described her studies of the Organic Cation Transporter 2 protein found in kidneys.

This year’s Keynote Speaker was Professor Kimberly Orth (University of Texas Health Sciences Center) who spoke about her laboratory’s research into the mechanisms by which invasive pathogens can commandeer the host cell’s signaling mechanisms in an enlightening talk entitled “Black Spot, Black Death, and Black Pearl: The tales of bacterial effectors.”

Based on the excellence of their research and poster presentations, four UAN Travel Awards were presented to Shiana Ferng, Kevin Carlson, Wesley Cai, and Jackie Hu. Shiana was able to use her Award to attend the Experimental Biology meeting in Boston. Through generous donations made by the University of Arizona Offices of the Vice President for Research, College of Science, BIO5, Vice President for Student Affairs, Ventana Medical Systems, Sanofi-Aventis, UAN/ASBMB, and the Southern Arizona American Chemical Society Chapter, we were able to make a number of cash awards to other university and high school presenters. Currently, Wesley Cai and Andy Phan are planning the BECUR 2014 Conference to which Professor Roy Parker (University of Colorado and HHMI Investigator) who is formerly from the UA Molecular and Cellular Biology. Professor Parker’s laboratory has been one of the leading groups investigating cellular RNA processing, transport, localization, and turnover.
We BlastOff Again!

Aishan Shi, Wesley Cai, Andy Phan, and James T. Hazzard

The University of Arizona UAN Chapter and Biochemistry Club held its second fun and successful middle school summer science Blast-Off! camp from June 10 – 14, 2013. Students from Safford, Dodge, Drachman, and Playa del Rey middle school students participated in a week of scientific exploration and fun during our revised summer camp in which undergraduates served as group leaders and mentors. Yurika Isoe, a recent graduate of University High School and now freshman at the UA, returned for her second year as a peer-mentor and former camper. We also had two UA students participating in the UA Molecular and Cellular Biology BLINK (Biology Learning iN K-12) Program, Priscylla and Cassandra Diaz, join us as mentors marking a first-time collaborative effort between our two outreach programs. Finally, we were very lucky to have two teachers, Ms. Melissa Boldt (elementary) and Ms. Linda Kadich (middle school), join our group of counselors making significant contributions to the way in which we presented our activities based on their extensive experience in dealing with student of this age.

Building upon our overwhelming success from our first Blast-Off! in 2012, the members of the UA UAN Chapter extensively redesigned this year’s camp to include more field trips and a decidedly more biological curriculum. The week began by looking at the biological world at the organismal level and then systematically working our way to a more cellular level by discussing “life” within a living cell. Students made field trips to the “famous” UA turtle pond where they collected water samples that were later examined under microscopes allowing them to make drawings of a variety of protozoa, the renowned UA Tree Ring Laboratory where a staff scientist described the fascinating topic of tree ring research and how these studies give us information about past environmental conditions, as well as the interactive holographic facility at the University Computer Center where the campers were able to take a virtual tour inside a living cell as well as taking a tour inside a Martian crater based on images sent back to Earth from the UA Mars Rover. Biochemistry Club member Elina Ly designed three dimensional models of the cell interior complete with enzyme structures (including RNA polymerase bound to DNA), that had been developed using PyMol structures using Protein Data Base coordinates. The trip occurred at a time during the camp when students were studying DNA structure using DNA modeling kits obtained from the Milwaukee School of Engineering’s Center for Biomolecular Modeling specifically designed for middle school students. Other activities included causing spinach leaf disks to float by light induced oxygen production, glowing E. coli cells due to GFP expression, DNA extractions from cheek swabs, and an incredibly popular animal survival “Wheel of Fortune”-type game. Professor Carol Dieckmann once again delighted the students in her talk about the large eye spot, flagella, and phototaxis in Chlamydomonas, while a new faculty member Dr. Pascale Charest gave a very interesting talk about chemotaxis in Dictyostelium discoideum. On Friday afternoon, campers performed a play for their parents and family members in which they took on the characters and characteristics of different cellular organelles, proteins, DNA, and mRNA after spending the week learning about these biological entities. Perhaps the most enthusiastically received activity of the entire week followed the play when the participants used the UA undergraduate mentors as targets for water balloons, something that is not completely unwelcome in the 100°+ heat of an Arizona afternoon in June.

BlastOff! was generously supported by funding from the UAN/ASEBMB, the UA Offices of the Vice President for Research and College of Science, Sanofi-Aventis, Ventana Medical Systems, and anonymous donations from Departmental faculty members. Tucson area food vendors Monkey Burger Restaurant, Chick-fil-A, and Brooklyn Pizza Company kindly provided lunches for the participants as well.