



Maria McGlinch reaches new heights in Chile. More photos from abroad, page 8.

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Above: Chem & Biochem Researchers meet at the Great Hall at Saint John's.

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Chem and Biochem Students Find Range of Summer Opportunities

Chemistry and biochemistry majors found many different ways to complement their academic learning with new skills over the summer. A number of students found research positions; others worked in health care, youth development and other areas.

Quite a large group of students returned to campus for the chemistry department's

summer undergraduate research (SUR) program. **Gabe Amon '15**, **Billy McCue '15** and **Lorien Rusch '16** worked for **Dr. Christen Stollo**, working to develop new techniques for identifying and quantifying secondary organic aerosols, with the aim of evaluating their impact on the environment. **Tom Steichen '15** and **Jeff Bowers '15**, together with

Dr. M. A. Fazal, studied the interactions of nanoscale objects with biological systems, with an emphasis on nanotoxicology, and strove to develop paper-based devices for simple, fast, and ultrasensitive detection of trace analytes. **Anna Luke '15** and **Zach Brown '16**, under **Dr. Alicia Peterson**, investigated the kinetics (continued page 4)

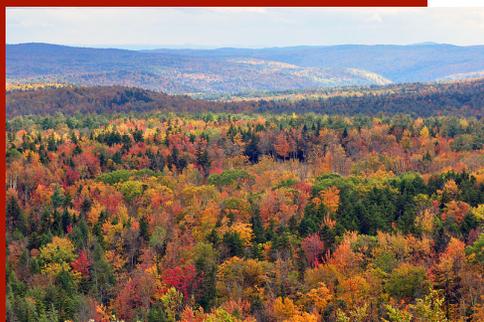
CSB Alumna Finds Challenges, Rewards in Engineering Career



Amy Zweber

Seeing the future
in the next
generation of
microelectronics

Fall colors in the Green Mountain State. *Wikipedia commons photo.*



It's been over ten years since **Amy (Geissler) Zweber '02** took a walk in the Saint John's woods or cheered at a Saturday football game in the Natural Bowl. Now a process and development engineer for IBM in Vermont, she is an expert in advanced lithography techniques used for making electronics.

Zweber spends much of her time submerged in the chemistry and optics that is used to create masks. Masks are the patterns through which a photosensitive surface is exposed to light in order to manufacture microchips. The process requires exacting attention to detail, producing features as small as 7 nm.

"My responsibilities include leading teams in evaluating next-generation materials, optimizing process conditions, and troubleshooting defect or yield loss issues," explained Zweber. "Typical work days are filled with project team and supplier meetings, analyzing data, preparing and reviewing project roadmaps, and keeping current on industry research."

Keeping current means reading journal articles, but it also involves networking and travel. About once a year, Zweber attends a professional conference to present a paper. Recent meetings included Advanced Lithography and Photomask Technology, both sponsored by SPIE, the international society for optics and photonics. "I also traveled to Japan as lead engineer in a best of breed tool evaluation," added Zweber.

After graduating from CSB/SJU with a major in chemistry and

minor in math, Zweber attended North Carolina State University in the Chemical and Biomolecular Engineering Department. While at NCSU, she studied how supercritical carbon dioxide could be used as a solvent to enhance processing of resist materials. These materials are light sensitive polymers used in the manufacture of microelectronics. She took the job offer from IBM directly after completing Ph.D work.

"I did know in college that I wanted to move into chemical engineering as interests and job opportunities better matched my personality," said Zweber. She felt it was important to consider not just the major she wanted to pursue, but what type of jobs would be available with that degree. Nevertheless, she also encourages students to make the most of their experiences and see where they will lead. "My current job was not planned," she explained, "but rather a result of pursuing various opportunities as they arose."

Apart from the science, personal connections have been extremely important in Zweber's work. "The people I work with are extremely helpful and collaborative, which makes for a great workplace," she said. "The work is challenging, but the team pulls together their skills and resources to find a solution."

When she isn't working, Zweber takes advantage of the natural wonders of Vermont. "I like going hiking, sailing, and skiing," she said. "I also love spending time with my 3 year old girl and 2 month old boy." That balanced lifestyle, clearly a goal of a CSB/SJU education, will hopefully drive her creativity for years to come.





Defending All of Our Health

A Public Policy Career in Washington, DC

explore Washington, both geographically and intellectually. AAAS thought so, too. After developing an exit plan in case she decided to return to the lab, she set out for K Street.

The exit plan wasn't necessary. Abraham loved the work. She was assigned as a fellow in the Division of International Health Security at the Department of Health and Human Services, working with international partners on initiatives designed to enhance domestic and international health security.

Currently, Abraham is a senior analyst for Gryphon Scientific. She explained, "We're a science consulting firm that uses rigorous scientific analysis to solve problems related to public health, biodefense, and emergency management." Much of her day is spent meeting with partners and clients, as well as supervising her team of analysts who collect data and prepare reports on issues related to health security.

And as for that entrepreneurial course at Stanford, it may still bear fruit. Abraham and her husband are at work on a new venture that will provide labs with ways to share protocols, expertise, unsuccessful results and other information that might never get published, but which can be invaluable for practical work.

The bottom line? She is having that impact she craved. As Abraham said, "I'm making a difference in the way the US government thinks about and uses scientific data to make informed decisions about how to make the US, and the world, safer,"



Teresa Abraham with husband Neil Bjorkman '01 and their one-year-old son

Teresa Abraham '02 didn't set out to be a public policy expert. A double major in biology and chemistry at CSB | SJU, she wasn't sure what career lay ahead of her; she only knew it wasn't medical school. Things seemed to crystallize when she applied for and was accepted to a summer undergraduate research program at Princeton. After that experience, her sights were set: she brought her considerable talents to bear on a career in scientific research.

How, then, did she find herself last month sitting in a panel discussion on the ebola crisis at the Africa Center for Strategic Studies in Washington, DC?

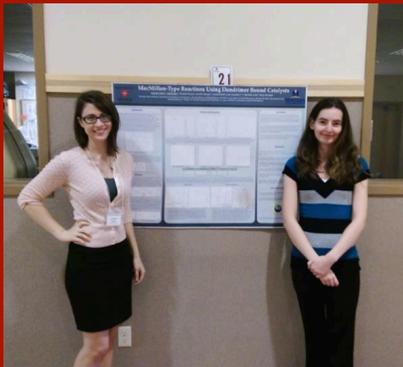
For some time, the research career seemed inevitable. After graduating from CSB | SJU, Abraham went on to graduate study at the University of Wisconsin-Madison. There, her research revealed the molecular details of a long range interaction within the Hepatitis B viral RNA that was crucial for viral replication. Afterwards, as a postdoc at Stanford University, she studied the role of microRNAs

in translation control and mRNA turnover in Hepatitis C infected cells. It was arduous but exhilarating work.

"I'm really glad I made the decision to go to graduate school," Abraham said recently. "I had an amazing experience, and the highs and lows were totally worth it!"

Still, it was becoming clear to her that she wanted to have a more immediate impact than was possible through the long-range timeframe of the basic research laboratory. The opportunity arose to take a Life Sciences Entrepreneurial class at Stanford, where scientists paired up with law and MBA students to come up with ideas that could be pitched to venture capitalists.

"It was the most fun I had!" declared Abraham. Subsequently, she looked for other opportunities. A two-year fellowship was available at the American Association for the Advancement of Science (AAAS) in DC. That got her thinking about just how much impact decisions in Washington have on the most basic directions of scientific research. Knowing that a career at the National Institutes of Health was inevitably in her future, she decided this would be a good chance to



Autumn Flynn and Asha Kopp

(from page 1) of a rhodium hydride dehalogenation catalyst for potential use in remediation of contaminated water systems.

Brianne Gibson '15 and **Samantha Hurrell '15**, working with **Dr. Kate Graham** and **Dr. Nicholas Jones**, gained experience in methodology development by synthesizing epoxides containing a hydroxyphosphonate; these compounds are promising precursors for pharmaceutical targets. **Autumn Flynn '15** and **Asha Kopp '16** worked with Dr. Jones, spending the first half of the summer in the lab of Mary Cloninger at Montana State before resuming work at CSB | SJU. While at MSU, Flynn and Kopp were awarded first place for their undergraduate research poster.



Alex Frie (right)

Becca Flynn '16, **Erica Sinner '15** and **Sam Klinker '15** worked with **Dr. Ed McIntee** and **Dr. Henry Jakubowski** to develop new inhibitors for the enzyme low molecular weight protein tyrosine phosphatase (LMW-PTP), with an ultimate goal of finding new anti-cancer agents. **Bailey Drewes '15** and **Matt Lerick '16** collaborated with **Dr. Rachel Hutcheson** to elucidate radical SAM enzyme mechanisms; these enzymes are involved in DNA repair, viral inhibition, and enzyme activation.



Claire Buysse

Jerrod Russell '16 worked with Dr. Brian Johnson, synthesizing new coordination complexes as model compounds for multicopper oxidases, which bind and reduce oxygen in the cell. **Levi Salzl '15** and **Clare Johnston '15** used ring-opening methods to make polyesters in a project with **Dr. Chris Schaller**.

Other students played important supporting roles on campus. **Tim Doyle '15** worked on a lab development project under Drs. Graham, McIntee and Schaller. **Joe Pollei '15** and **Meghan**

Glasgow '16 worked in the Ardolf Stockroom with **Mrs. Jochman**.

Adrian Demeritte '16 was the mentor and tutor for the FoCuS scholarship summer program. A little further away, **Frantz Soiro '15** was a student manager and tour guide for Admissions at Saint John's.

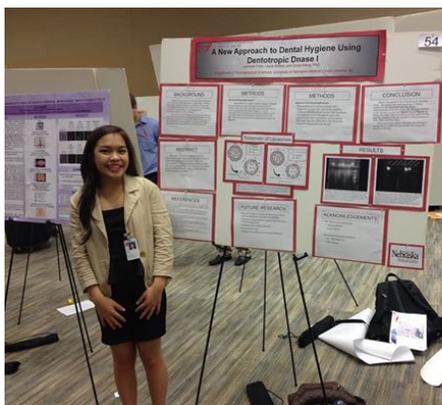
Ari Klein '15 and **Jamia Moss '15** participated in the summer research exchange program with Southwest University in Beibei, China. A Southwest student, Robert Liu, came to CSB | SJU for the summer to join the Fazal lab.

Several students found positions at SUR programs at universities nationwide. **Alex Frie '15** spent the summer at University of Milwaukee Freshwater Sciences studying dissolved organic matter in the Milwaukee River and its estuary.

Jasmine Tutol '16 worked in Dr. Dong Wang's lab at University of Nebraska Medical Center, encapsulating DNase I into liposomes using a detergent dialysis method. **Hieu Van '16** was at the University of Colorado Cancer Center with Dr. Mayumi Fujita, working to identify specific genes that might serve as diagnostic markers or therapeutic targets for metastatic melanoma. **Emma Bonglack '17** did cancer research at UNC Chapel Hill. **Claire Buysse '17** worked at North Dakota State University with Dr. Seth Rasmussen developing a monomer to make a flexible, semiconducting copolymer. **Rejene Giinther '17** worked at the



Adrian Demeritte at Boys & Girls Club



Jasmine Tutol

University of Washington synthesizing magnetite nanowires.

A couple of students found positions with government labs.

Haley Chatelaine '16 worked with the U.S. Department of Agriculture's Agriculture Research Service on productive and sustainable biomass systems.

Emma Johnson '16 worked at the Department of Energy's National Energy Technology Laboratory in Morgantown, WV through the Mickey Leland Energy Fellowship.

A few students found clinical research posts. **Mel Quintanilla '15**, **Tyler Bruinsma '17** and **Luke Morrey '17** all worked at Mayo Clinic.

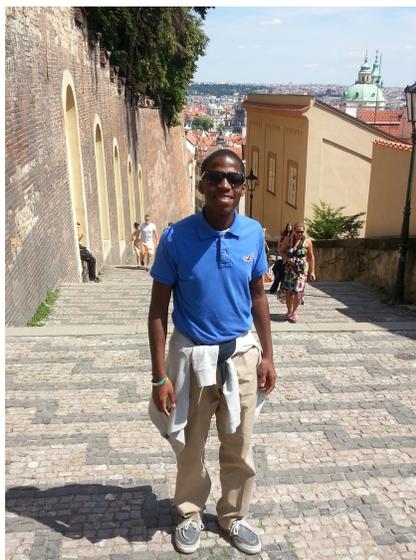
Quintanilla examined the role of Heterochromatin Protein 1 gamma (HP1g) in chronic pancreatitis. Bruinsma worked in the Pulmonary and Critical Care Medicine,



Melissa Quintanilla

Thoracic Disease Research Unit. Morrey worked in the Department of Orthopedic Surgery.

Some students secured healthcare-related activities. **Ben Heath '16** was an intern with Gillette Children's Healthcare. **Ellen Black '15** was a Jackson Fellow, working in dental care. **Raymond Twumasi '17** worked as a dietary aide in a nursing home. **Kyle Spengler '16** spent the summer shadowing Dr. Hsin at Cornerstone Orthopedics surgery center in Louisville, Colorado.



Christian Wilmore in Prague

In other areas, **Syn Lim '15** was a camp counselor with the Della Keats Health Sciences Summer Program at the University of Alaska, Anchorage. **Ian Manion '15** was a camp counselor in Minneapolis.

Josh Lorenz '15 worked at a summer camp for children with diabetes in Texas. **Christian Wilmore '15** was an international basketball referee at the International Basketball Federation (FIBA) U17 World Championships for Women in the Czech Republic.

In possibly the highest-impact position of the summer, **Kirsten Sewall '16** kept thousands of people safe and healthy as an intern at the St. Cloud Water Treatment Plant.



Kyle Spengler (left) with Dr. Hsin

Hot Off the Presses

Chem minor **Krystal Heinen '15** had her work from the China exchange program published: Zhi Guan, Yuan Luo, Bao-Qiang Zhang, Krystal Heinen, Da-Cheng Yang, Yan-Hong He. The application of a structurally simple, recyclable, and large-scale L-prolinamide catalyst for asymmetric aldol reactions. *Tetrahedron: Asymmetry* **25** (2014) 802–812.

Other recent publications:

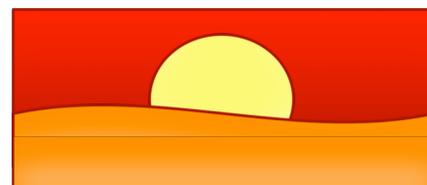
Akira Yoshimura, T. Nicholas Jones, Mekhman S. Yusubov and Viktor V. Zhdankin. Hypoiodite-Mediated Catalytic Cyclopropanation of Alkenes with Malononitrile. *Advanced Synthesis & Catalysis* **2014**, 356 (16), 3336–3340.

Edward J. McIntee,* Betsy J. Hutchinson and Kate J. Graham. A Multivariable Enzymatic Resolution Laboratory Experiment. *Chem. Educator* **2014**, 19, 278–282.

Kate J. Graham,* T. Nicholas Jones, Chris P. Schaller and Edward J. McIntee. Implementing a Student-Designed Green Chemistry Laboratory Project in Organic Chemistry. *J. Chem. Educ.* Publication Date (Web): October 07, 2014.

Kate J. Graham *, Chris P. Schaller , and T. Nicholas Jones. An Exercise To Coach Students on Literature Searching. *J. Chem. Educ.* Publication Date (Web): October 15, 2014.

Chris P. Schaller *, Kate J. Graham , and T. Nicholas Jones. Synthesis Road Map Problems in Organic Chemistry. *J. Chem. Educ.* Publication Date (Web): October 16, 2014.



Dr. Annette Raigoza Joins Faculty

New Professor Does More Than Just Scratch the Surface



Dr. Annette Raigoza

Driven to learn, and teach, more about the fundamental interactions at the interfaces between materials

The chemistry department has a new tenure-track faculty member in the area of physical chemistry. **Dr. Annette Raigoza**, a 2012 Ph.D. graduate from the University of Notre Dame, is teaching lecture courses Chem 255 (Macroscopic Chemical Analysis) and Chem 318 (Microscopic Chemical Analysis). In addition, she teaches introductory and integrated labs.

Raigoza is originally from Odessa, Texas, a city of 100,000. Located in the oil- and gas-rich Permian Basin of West Texas, Odessa has experienced rapid growth in recent years. Raigoza attended Permian High School, the intense football culture of which was depicted in *Friday Night Lights*.

Raigoza remained in Odessa to go to college at the University of Texas of the Permian Basin. A small state school, it had a chemistry department with just two faculty members but a close-knit atmosphere. Raigoza and her classmates were involved with the Chemistry Club, doing demonstrations for elementary school children and at the mall.

It was while tutoring general chemistry classes that Raigoza found an interest in teaching. Her instructor had encouraged her to become a chemistry major, then hired her as a TA. Meanwhile, her organic chemistry instructor got her interested in doing research on projects involving waste oil recovery and chemical engineering, and later set her to thinking about

graduate school.

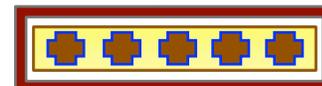
Having been raised in the West Texas desert, with hot, dry summers and little seasonal variation, Raigoza felt a move to the high northern climate of Indiana was adventurous. She completed a master's at Notre Dame, but decided not to push on for a Ph.D. at that point; her advisor, Dr. Dennis Jacobs, had moved into an administrative position away from the lab and she had things to attend to at home. She taught for a couple of years, then joined the laboratory of Dr. Alex Kandel, also at Notre Dame. In the Kandel lab, a small group of researchers used scanning tunneling microscopy (STM) to study the interactions of surfaces with other phases, such as molecules in vapor, in solution, or even a surface-bound layer. It's a technique Raigoza still uses today at CSB | SJU.

With a Ph.D. in hand, Raigoza joined the lab of Dr. Lauren Webb at the University of Texas at Austin. A new focus on studying the interactions of biologically relevant surfaces would provide Raigoza with increased breadth as a scientist. In return, Raigoza was able to provide the Webb lab with expertise in techniques from her old lab at Notre Dame.

Although she thoroughly enjoyed her research experiences, Raigoza never lost her interest in teaching. "Some of my favorite activities throughout my graduate and postdoc years have been working

with undergraduate and high school students," she said, "so I knew that needed to be a big part of what I did professionally."

When asked about the over-arching theme of her new research program at CSB | SJU, Raigoza smiled, ready to talk about a topic she loves. "Mediating the interactions between biological materials and inorganic surfaces is an important, but difficult, aspect in the development of biomedical implants, biosensors, and other biotechnologies." Her students will prepare self-assembled monolayers designed to either encourage or inhibit biomaterial adsorption. She went on to explain, "Initially, my research will primarily focus on exploiting thermodynamic and kinetic factors that are involved in the formation of self-assembled monolayers: intermolecular interactions, molecule-surface interactions, and deposition parameters." Scanning tunneling microscopy (STM) will be the main method of characterization to determine the ordering and aggregation of molecules on the surface. Raigoza has already started working in the lab with a couple of sophomores, **Rejene Ginter** and **Jenny Paul '17**, as well as juniors, **Joey Cartier**, **Alec Bramer** and **Alex Schlangen '16**.



Breaking out the new STM



New Group of FoCuS Scholars Arrives on Campus



The class of 2018 FoCuS scholars arrived on campus in June, ready to start a summer of chemistry and social bonding. The newest scholars are **Rosemarina Armstrong, Talitha Burtis, Taylor Graham, Hannah Holst, Stephanie Jean, Destiny Johnson, Grace Lindquist, Casey Palmer, Serai Seymour** and **Samantha Tinucci**.

FoCuS is supported by a grant from the National Science Foundation.

Left: Three generations of FoCuS students

Dynamic Molecular Stimulations: Student Activities in Chemistry

The Chem Club hosted O-CHEM bingo in September and Mole Day with liquid nitrogen ice cream in October, attended by around 70 students. Next up is an "Ask A Senior" panel in November, complete with Gary's pizza. In December, the club will host a gathering to make Christmas ornaments.



Jeff Bowers, Anna Luke and Alex Frie of Chem Club

A few chemistry faculty members and approximately 35 **chemistry and biochemistry majors** attended a symposium in September honoring analytical chemist Izaak M. Kolthoff, considered the father of analytical chemistry. The event was part of a National Historic Chemical Landmark celebration sponsored by the American Chemical Society.

The acclaimed CSB/SJU students dance group, **Element**, is back for another year. The group was founded by **Emmanuel Freeman '15**; other members include **Brianne Gibson '15, Emma Bonglack '17, and Claire Buysse '17**. They performed at the IWL Inauguration Event Showcase for President Mary Hinton. Upcoming events include the BSA meet & greet with the presidents; the CSB Dance Show in November; the Archipelago Gala in December; and Lee Dillard's Spring Dance Show.



Transitions

Dr. M. A. Fazal was granted tenure and promoted to Associate Professor this spring. Fazal is a graduate of the University of Dhaka, Bangladesh, and the University of Washington.

Tenure is widely used in the United States to protect professors from firing without just cause; it was implemented following politically-motivated firings during the nineteenth century. At CSB | SJU, the review period prior to tenure is six years.

Dr. George Anquandah is currently a visiting assistant professor in the chemistry department at St. Olaf College. Anquandah taught in the CSB | SJU Chemistry department during 2012-2014, helping to cover increased course demand during that time.

Dr. Neil Tomson was also an introductory chemistry course and lab instructor, hired for academic year 2011-12. He went on to take a research position at Los Alamos National Laboratory. This fall, he started in a permanent faculty position at the University of Pennsylvania.

Postcards from Abroad



Clare Johnston '15: "I studied abroad during the Spring 2014 semester in Cork, Ireland. In this picture I am on the grounds of Blarney Castle, home of the Blarney Stone. Legend has it that if you kiss the stone you will be granted the 'gift of gab'."



Ben Kollaja '16: "After the conclusion of my semester in Germany, my sister and cousin flew to meet me in Munich, and we proceeded to travel via train and bus through the Czech Republic, Austria, and Croatia. This picture was taken in an old castle on the island Krk, lying off the coast of Croatia in the Adriatic Sea."



Frantz Soiro '16: "I am studying abroad in Cannes, France for the Fall of 2014. This is a picture of me at "Chateau De La Napoule". My experience thus far has been unexplainable. Being able to embrace the French culture in so many ways has made me grow as an individual and appreciate so many other things."

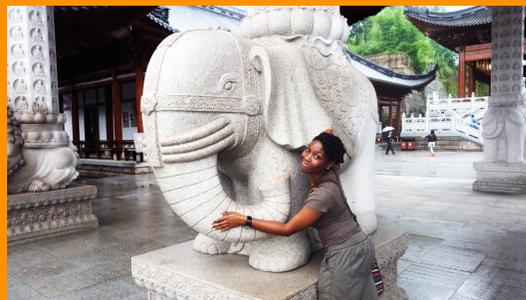


Brianne Gibson '15: "This is at the top of *La Muela*, located in Quetzaltenango, Guatemala. Not only was my study abroad experience beneficial to my Spanish language skills but it was also an enriching experience. I was able to make connections between the indigenous culture, the Guatemalan culture and my own Bahamian culture. I have had encounters with many *guatemaltecos* who have shaped my growth in such a way that I am closer to becoming the person I wish to be."



Ari Klein '15: "This was a photo of some street food that they sell late at night right outside of the university (Southwest University, China). The food is all assortments of vegetables, meats, and some organs even. You pick out whatever you want, they cook it for you, and serve it to you on a stick. My favorite part about the food was that it was always available to share with some friends late at night."

Front Cover: Maria McGlinch '16. "Here is a picture that was taken last weekend in the Atacama Desert in northern Chile. The Atacama is the driest non-polar desert on earth. On the evening this picture was taken, we hiked up along the spine of a range of small mountains to reach a plateau from which we watched the sunset."



Jamia Moss '15: "This is at the entrance of the Dazu Rock Carvings outside of Beibei, China. The Carvings are created directly from the cliff face and depict important aspects of Buddhism. This was taken during the Summer 2014 Research Internship at Southwest University."

Experiential Reflections

CSB/SJU students talk about their healthcare-related internships



Ellie Black '15: 2014 Jackson Fellow

"I worked at Children's Dental Services in Minneapolis. The overall goal of my job was to be involved with a nonprofit organization in order to gain skills applicable to leadership and to my future career.

"I worked on a project for the Minnesota Department of Health. I shadowed and sterilized instruments in the clinic, as well as participated in an offsite clinic. I also did basic office tasks such as charting, attending meetings, working on the employee

handbook, and organizing patient records.

"It was a great opportunity to work in an urban setting with a diverse group of people. I have only had jobs in rural settings before this summer. It was also fun to have responsibilities that were essential to the clinic's success.

"My favorite part of the job was participating in the offsite clinic. I accompanied one dentist and one assistant to Litchfield where I

was able to interact with patients, schedule restore appointments, sterilize instruments, and shadow the dentist closely. The day confirmed my desire to become a dentist.

"The opportunity to work in a nonprofit dental clinic opened my eyes to the dedicated and hard-working employees that work to serve an underserved population. It was an amazing opportunity to be surrounded by these people for the summer."

Ben Heath '16: Gillette Children's Hospital

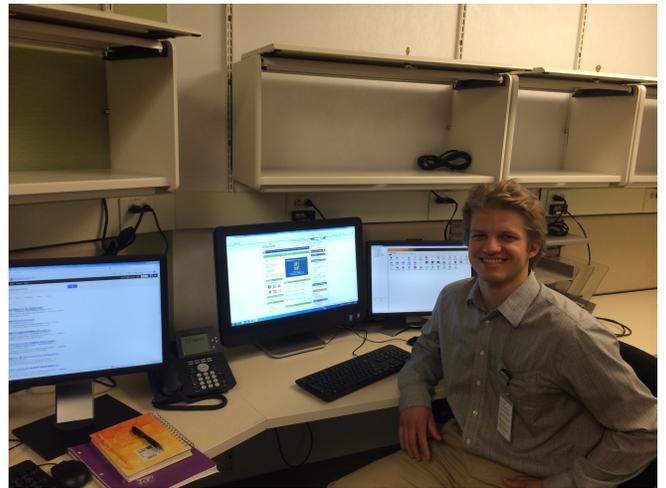
"I was a clinical research intern at Gillette Children's Specialty Hospital in St. Paul, Minnesota. The overall goal of my project was to identify risk factors that correlated with propensity to fracture in the cerebral palsy patient population. Findings from this study will be utilized by physicians to identify patients who are in the at-risk population.

"Working at a Hospital was definitely a fun experience. Although the intern research office was located away from the clinics, I was still able to get to know physicians from a variety of specialties. Through these connections I had the opportunity to shadow physicians and observe several surgeries. Gillette also scheduled weekly seminars for the interns to

attend covering current research and other topics which were particularly insightful.

"The most interesting part of my internship was the time I spent in the Alzheimer research laboratory. I frequently visited when my mentor had me drop off samples or when I finished my tasks early and was waiting for additional projects. I enjoyed the opportunity to observe and speak to the researchers testing the administration of pharmaceuticals to lab rats with Parkinson and Alzheimer's disease.

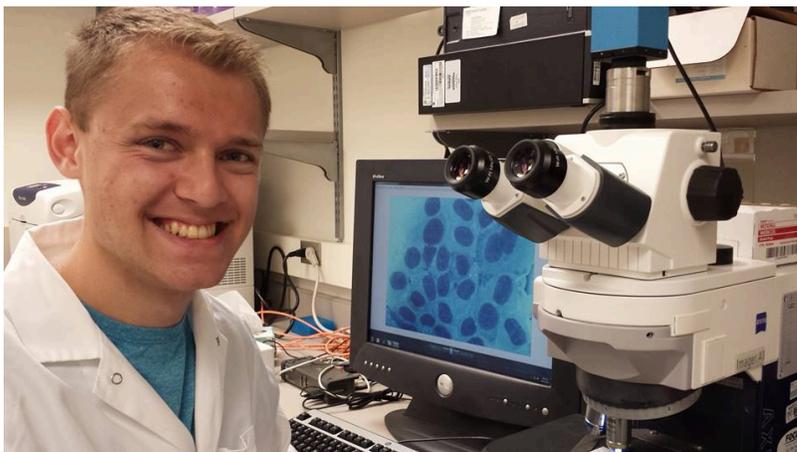
"This was not a paid internship. However, it was invaluable in



terms of the knowledge of clinical research I gained from participating. Additionally, I believe the results from the

study are going to be published which is pretty exciting."

Tyler Bruinsma '17: Thoracic Disease Research Unit, Mayo Clinic



"Our lab was investigating two major diseases. Idiopathic Pulmonary Fibrosis is scarring of the lungs with no apparent cause. We screened drug combinations and tested their ability to suppress fibrotic mRNA.

"Pneumocystis Pneumonia is a type a pneumonia caused by a fungus that is often found in immune-compromised patients. We were attempting to characterize the cell-wall of

this fungi so that it could be better targeted in the future.

"Most days my primary job was just general lab upkeep and various small projects but I also had a few ongoing projects.

"I actually loved caring for the animals. It really pushed my comfort zone but I kind of felt like I had a bunch of small rodent patients that I was caring for. It kind of felt like a precursor to a part of my future in medicine."



"I worked at the Lineberger Comprehensive Cancer Center at the University of North Carolina- Chapel Hill. Our research focused on investigating the role of the PI3K/AKT pathway in maintaining oncoprotein levels in KRAS mutant pancreatic cancer cells. This pathway has been shown to affect cancer cell growth and proliferation, so inhibiting it might be a good strategy against cancer tumor growth.

"I spent most of the first week observing my mentor and principal investigator, working with them to come up with a detailed plan for what I was going to be doing for the next two months. Since we were trying to figure out whether

the PI3K/AKT pathway played a role in maintaining myc protein levels in pancreatic cancer cells, I treated the cells with varying concentrations of the PI3K/AKT pathway inhibitor. After treating the cells, I lysed them to obtain the protein, and then used western blotting to analyze protein levels. It took about a week to get one set of blots done, so I spent the next few weeks manipulating different variables such as inhibitor concentration, cell incubation time, treatment time, cell count, cell line, and inhibitor brand, and I ran western blots for each variation of the experiment.

"Chapel Hill is a fun, small college town with lots of

trees, and the fact that the campus is actually on a hill makes everything look even more beautiful.

"My favorite part of my research experience was the lab meetings, and the graduate students' and post docs' presentations. Being a part of the lab meetings allowed me to get to know all the other members of my lab, and showed me how much the lab as a whole truly cared about finding a cure for cancer. the focus of these events was translating the lab results and findings into actual real life applications, on real people who are really affected by pancreatic cancer."

Emma Johnson '17: Department of Energy - National Energy Technology Laboratory in Morgantown, WV (Mickey Leland Energy Fellowship)

"The overall goal of my project was to determine the accuracy, precision, and detection limits of the newly-developed NETL Raman Gas Analyzer.

"Throughout the first part of the summer, I spent a significant amount of time reading and doing research on comparable instruments and techniques, as well as the techniques utilized in Raman spectroscopy, to gain a better understanding of the RGA and the current competition. Once the lab was ready for me, I would spend about half of my day running gas samples through the RGA at varying concentrations for data collection. I would spend the other half analyzing the data, drawing conclusions, and deciding which tests would be

run the next day. The final week of the internship was spent at a Technical Forum in Pittsburgh, PA, presenting my research from the summer and hearing about the other interns' work.

"Working at the Morgantown NETL location was incredibly fun because there were about 20 other interns working on-site. I was able to make new friends and spend time with those people doing activities all around Morgantown and the neighboring cities and states. Morgantown itself is a great city that has everything you could need such as shopping, movies, bike trails, hiking, restaurants, and local events. Also at NETL, there are so many innovative ideas for making the

world a better, cleaner place, and I got to spend my summer learning about those, seeing people put into action their plans.

"My internship was a better experience than I could have ever imagined! I made lifelong friends, learned more about the world around me, and grew into a better scientist and person."



How Do I Get That Summer Job?

Classified ads in hometown newspapers will sometimes reveal openings in science-related areas. Exceptional sophomores and juniors majoring in chemistry and chemical engineering can apply for a prestigious SCI

Scholars summer internship. The program is sponsored by the Society of Chemical Industry (SCI), America International Group (AIG), American Institute of Chemical Engineers (AIChE), and the American Chemical Society (www.acs.org/sci). ACS also hosts

a summer internship search engine; summer job postings appear in early fall (www.getexperience.dreamhosters.com). At CSB | SJU, Experiential Learning maintains a list of internship programs (<http://www.csbsju.edu/elce/i>

<http://www.csbsju.edu/elce/i>nternship-program), as does Career Services (<http://www.csbsju.edu/career/students/jobs-internships>). Job fairs are also a good avenue for making contacts with potential summer employers.



Haley Chatelaine '16: US Department of Agriculture

"The overall goal of our initiative (CenUSA Bioenergy) is to explore and implement the use of prairie grasses for biofuel. It has ten objectives, but the portion of the project that I worked for involved developing sustainable and productive methods for prairie grass cultivation on marginal lands.

"I took greenhouse gas samples in corn and switchgrass fields, analyzed data on nitrogen use efficiency in

switchgrass, helped with field maintenance (pitching hay and hoeing weeds), and took soil samples.

"It was awesome to get out in the field and see how ag research works. It took some time, but it was cool to actually see how different cultivation practices influenced the crops, and it was great to understand how scientific research translates to the lives of American farmers.

"My favorite part was being able to get out in the field

and get my hands dirty to see where the data came from. It was cool to know that a research scientist didn't have to be cooped up inside to make influential discoveries.

"Even though this internship wasn't related to chemistry, it was a really great way to understand how a career in research works. Plus, I learned a bit more about myself in that I really like ag research. So, I'd encourage others to go out and explore research opportunities even if they don't sound like they're in your major!"

Kirsten Sewall '16: St. Cloud Water Treatment Lab, St. Cloud, MN

"The overall goal of my job is to make sure all the chemical levels in the water are correct, and that there is no bacteria present in the waterlines that run under St Cloud.

"Each day I get to run new bacteria samples on the finished water we produce and the water clarifiers. I also get to measure the total fluoride in the finished water, total color, free ammonia, nitrates, tannin lignin, total organic carbon, phosphates, and odor of the finished water. I also get to go out on distribution which is where we drive around to different collection sites and get samples of water to test back

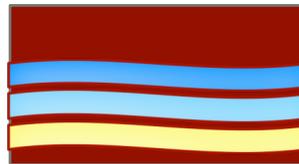
at the lab. We visit 19 different collection sites all around St Cloud.

"One of the things I love about the location of my job is that the building is right off of the Mississippi River, so I get to sit out by the river everyday for lunch when it isn't cold outside.

"My favorite part of the job is everything. I know this is cliché, but I love everything that I do there. There is never a boring day at the lab, and the time just seems to fly by when working. My favorite test; however, is the total organic carbon tests. Once

the test is done, you can mix up the sample in the vial with the blue indicator vial inside the vial. When the two mix, the indicator vial turns from blue to yellow to pink.

"This is not just a summer job for me. I get to work there all year round, and I can keep my job up until 3 months after I graduate from CSB/SJU.



Luke Morrey '17: Mayo Clinic

"I worked at in the Department of Orthopedic Surgery.

"The overall goal was to determine the effect of DKK-1 (an inhibitor of the Wnt pathway) on reducing joint contractures in rabbit knees to see if a drug could be developed to prevent too many fibroblast cells after an injury.

"I worked in the Biomechanics Lab testing

the range of motion in rabbit knees after they had been treated with the drug. I also dissected cartilage and joint capsule from the knees to do an analysis of gene expression after treatment with the drug.

"The job location was nice because it was in downtown Rochester, so there was a lot to do for lunch and after work. The actual lab had a lot of cool

Biomechanics "toys" to play with that were very interesting. Overall it was an excellent work environment.

"This job was a great experience because it introduced me to a true research setting where the results are never perfect. It required a lot of trial and error and never really led to success, but I was told our discoveries were still important to the area of study."



The Cavendish Chronicle

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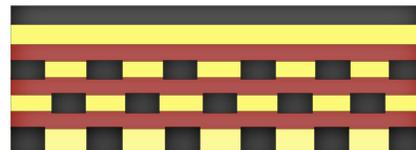
Grad Launch

What the Class of 2014 is Doing Now

New chemistry graduates have reported a range of activities this fall. **Blake Belland** is in dental school at the University of Minnesota. **David Croteau** is in the Naval Aviation Training Program with the US Marine Corps. **Chuck Dudek** is serving with the Benedictine Volunteer Corps. He is teaching science in Newark, NJ. **Graci Gorman** is working as a medical scribe at St. John's Hospital in Maplewood. **Harry Gerdes** is in medical school at Medical College of Wisconsin. **Yuan Huang** is in graduate school in the Business Analytics program at Arizona State University. **Michael Humbert** is in the chemical engineering program at University of Notre Dame. **Hasini Kalpage** is working as a junior scientist in the Clinical Genetics Unit at the University of Colombo, Sri Lanka. **Kaitlyn Lauer** is in dental school at

University of Minnesota. **Miguel Mendoza** was a CSB/SJU Center for Global Studies Fellow in the Dominican Republic. He returns to SJU to finish a second major in economics. **Carla Saunders** is in the Ph.D. program in chemistry at the University of California, Davis. **Melissa Stuckey** is in medical school at the University of Minnesota. **Erin Wissler** is serving with Americorps at Oaks Academy in Indianapolis, IN.

Biochemistry graduates have found similar opportunities. **Paige Armbrister** is in medical school at the University of the West Indies at Cave Hill, Barbados. **Ryan McMillan** is in medical school at Loyola University of Chicago Stritch School of Medicine. **Joe Wick** is in medical school at Vanderbilt University.



Alum Notes

Steve Vander Louw '92 is the Packaging Business Director for 3M. He is based in Shanghai, China. Van der Louwe has a Ph.D. in organic chemistry from Iowa State University.

Ted Pappenfus '95 has been promoted to full professor. Pappenfus is a faculty member in chemistry at the University of Minnesota Morris. He also serves as the interim director of the UMM Grants Development Office.

Will Oloo '06 had a publication in *Nature Communications* (Oloo, W. N.; Meier, K. K.; Wang, Y.; Shaik, S.; Munck, E.; Que, L. "Identification of a low-spin acylperoxoiron(III) intermediate in bio-inspired non-heme iron-catalysed oxidations." *Nat. Commun.* **2014**, *5*, Article number: 3046; doi:10.1038/ncomms4046). The work was the result of an international collaboration involving high-profile labs at Minnesota, Carnegie Mellon and Hebrew University of Jerusalem.

Jeff Bandar '09 is in a post-doctoral position in the Buchwald lab at MIT. Bandar

recently completed Ph.D. work in chemistry at Columbia University under Tristan Lambert.

Kerry Bauer '09 was awarded a Ph.D. in Biochemistry from Notre Dame University and is now a research chemist at the National Institute of Standards and Technology (NIST) in Gaithersburg, MD.

Charlie Swanson '11 is teaching science at Resurrection Catholic High School in Pascagoula, MS.

Valdez Rahming '12 has started medical school at St. George's University in Grenada.