

DEPARTMENT
HIGHLIGHTS:

- 8 Chemistry and Biochemistry Majors were named to the Dean's List.
- We have 25 Junior and Senior Chemistry majors.
- There are 17 Junior and Senior Biochemistry majors.
- We began the semester with 486 students enrolled in chemistry courses.

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The Cavendish Chronicle

VOLUME 25, ISSUE 1

FALL, 2009

Department Awarded Funding for
New NMR Spectrometer

The chemistry department has received a grant from the National Science Foundation (NSF) to purchase a new NMR spectrometer. The award, for about \$400,000, was given for a proposal led by **Dr. Edward McIntee**. The new instrument, with a 400 MHz magnet, will have higher resolution than the department's current spectrometer. It will have expanded experimental capabilities and will also include an autosampler, relieving teaching assistants from the task of running spectra. Nearly 1000 samples are routinely run for students in organic chemistry laboratory every fall and spring, and inorganic and

analytical chemistry students and student researchers run hundreds more on their own.

Major instruments in the department have typically been obtained through outside funding. The old 300 MHz NMR spectrometer, installed in 1996, was bought with funding from both the NSF and the Keck Foundation, in an effort led by **Dr. Brian Johnson** and **Dr. John Klasen**. Another major award from NSF supported the purchase of the LC/MS, used mostly in analytical chemistry, and a grant from the Camille and Henry Dreyfus Foundation enabled acquisition of the GC/MS, used primarily in analytical chemistry

but also in organic chemistry and environmental science. Both MS projects were led by **Dr. Kate Graham** and **Dr. Mike Ross**. In addition, **Dr. Henry Jakubowski** obtained NSF funds for a spectrofluorimeter used in biochemistry labs. All of these major instruments are also used by research students.

Representatives from the big three manufacturers of NMR instruments, Bruker, JEOL and Varian, visited campus early in the fall to discuss instrument needs and concerns with the faculty. A decision on the vendor is expected soon. The new spectrometer is scheduled to be installed by the summer.

On the Origin of *Biochemistry Online*:
An Approach Based on Chemical Logic

Not long after coming to CSB|SJU in 1986, **Dr. Henry Jakubowski** began to develop a new approach to teaching biochemistry in collaboration with Dr. Whyte Owen, a biochemist at the Mayo Clinic. There was no textbook available that directly supported this novel approach, so Jakubowski began writing supplemental material for his students. Jakubowski's innovative method of teaching biochem-

istry was first acknowledged when he received the *Burlington Northern Faculty Achievement Award* in 1993. His continued leadership in exploiting technology in undergraduate education was recognized with the *Tom Creed Memorial Award for Effective Electronic Pedagogy* in 2001. In 1998, Jakubowski and Owen published a paper describing the new approach to biochemistry in the *Journal of Chemical Education* titled

"The Teaching of Biochemistry: An Innovative Course Sequence Based on the Logic of Chemistry."

The early supplemental material soon evolved into a complete textbook, *Biochemistry Online: An Approach Based on Chemical Logic*. It received a boost from *Science Magazine* in its NetWatch feature in 2003. *Biochemistry Online* now receives approximately 4,500 hits a month from all over the world.



World map showing the locations of those who have read **Biochemistry Online**

Biochemistry Online (from Page 1)

When asked what made him decide to write an online text rather than a traditional print edition, Henry cited the enormous concentrated time commitment that a traditional text requires. An online text is a work-in-progress that can be added to as time permits. It is also a live text in the sense that it can be immediately revised in light of readers' comments and current developments in the field.

Biochemistry Online is available at <http://employees.csbsju.edu/hjakubowski/classes/ch331/bcintro/default.html>

Post-Graduate Perspective: Mayo Clinic

After graduation, **Rich Lahr '08** joined the Mayo Clinic as a laboratory technician. He had these reflections on this new stage of his life.

Rochester is a great city. When Jacqui and I first bought our new house, I would sit on our hill out back and watch the sun set behind us and watch the city light up in front of us. Initially, we thought that we would want a few acres to further our country living style; instead, we compromised. Our home is on only a third of an acre, but there is no one behind us and we have the conveniences of city living to go with it.

The Mayo Clinic is a great employer. I think that they really strive to maintain and instill their charter: "the needs of the patient come first." I work in the Toxicology and Drug Monitoring Lab. I

do think that the effort that I put into my duties does affect the patients in one way or another. However, I think that some of the patients would like us to affect their lives a little less, when drugs of abuse are involved. While most of the chemistry we do has its basis in analytical-organic purification, each assay is optimized to find exactly a specific profile of compounds. I sometimes think that I might be alone in my amazement in how these separate procedures and instruments can be orchestrated to produce a concise and reproducible result.

If there is any way that I can help any up-coming seniors see what it is like in the "real world," please don't hesitate to ask. While a shadowing or tours can be done, they tend to need some advanced notice.

A Conversation with Alicia Peterson

Alicia Peterson '03 recently completed her Ph.D. at the University of Minnesota in the laboratory of Kris McNeil. This fall, she returned to CSB/SJU and is teaching general & organic chemistry.

Do you have favorite memories from college?

Late night study breaks in the dorms. Going to aerobics and then McGlynn's with a group of friends. Amazing discussions in my classes, with friends, and with professors about anything and everything.

Why did you go to graduate school?

I wanted to learn more about chemistry, enjoyed research, and was pretty sure I wanted to become a professor at a liberal arts college.

What was your research area in grad school?

Environmental Organometallic Chemistry. My PhD technically is in Inorganic chemistry, but my graduate school experience was very interdisciplinary.

Any thoughts about the grad school experience?

It is amazing to be in an environment where so many people are excited about science. I have never felt like I "fit-in"

anywhere more than in graduate school. Figuring out what is happening in an experiment no one else has ever done before is a pretty unique experience. It is both frustrating and extremely rewarding.

What do you enjoy most about coming back?

Getting back in touch with my professors. Being back on a beautiful campus. Having a parking spot that I do not have to pay for that is also not a mile from the building that I work in.



Chem Majors Find Summer Training Opportunities

Winter is the season for applying for summer internship opportunities. Here is a look at some of the positions held by CSB/SJU chem and biochem majors during the summer of 2009.

Andrew Aebly '10 returned to the laboratory of Prof. Mary Cloninger at Montana State University to continue work on attaching catalytic sites to dendrimers. The long-term goal of this research, in collaboration with **Dr. Nicholas Jones**, is to introduce multiple sites of reactivity on one macromolecule, so that a substrate can undergo several different transformations with one reagent.

Kevin Bettendorf '10 spent some time working with Dr. Punit Kohli at Southern Illinois University. He contributed to work on electric field induced reversible pH microarrays. **Daryl Fields '10**

spent the summer in Dr. Sarah Larsen's lab in the chemistry department at the University of Iowa. He was able to encapsulate aspirin and ibuprofen inside of a biocompatible shell in order to control the release rate and release location of the drugs. Future work on the system will include functionalizing the exterior surface of the shell with ligands that can target cancer cells. **Nicole Gagnon '10** worked at 3M in the Structural Adhesives department of the Industrial Adhesives and Tapes Division. She tested shear strengths and other properties of different types of adhesives, such as epoxies, acrylics and cyanoacrylates.

Katie Hartjes '10 did research on the HIV-1 retrovirus at the University of Iowa. Katie found preliminary data that shows a correlation between cellular SR protein levels and viral mRNA splice products. This research could direct future endeavors to manipulate cellular SR protein levels in order to inhibit viral replication. **Amy Hogerton '10** was a Public Health Intern at Pediatric AIDS/HIV Care in Washington, DC. In conjunction with collaborators at George Washington University's School of Public Health, Amy worked on a study that will assess the degree to which AIDS/HIV-related stigma is practiced and felt in the District of Columbia. Amy also helped to start an anti-stigma campaign (called "Got Stigma?") in partnership with Howard University Hospital.

Anne Hylden '10 worked for **Dr. Nicholas Jones** this summer, testing and optimizing an alkynoic acid cyclization reaction that has been developed by students working with Jones over the past few years. Anne hopes the work will soon be submitted for publication. **Hadley MacIntosh '10** completed an NSF-REU internship in biogeochemistry at the Virginia Institute of Marine Science (VIMS) with Dr. Elizabeth Canuel. By looking at the fatty acid composition of algae growing in the York River and on a sloped algal flow-way, Hadley determined that algae is a potential source for biofuels and that the algae effectively removes nitrogen and phosphorus from the water. **Sarah Parker '10** worked on a collaborative project involving the fatty acid composition of eggs obtained from free-range chickens, under the supervision of **Dr. Kate Graham** and **Dr. Nicholas Jones** of Chemistry and **Jayne Byrne** of Nutrition. **Stephanie Roe '10** studied the kinetics of polymerization of caprolactone in the presence of Lewis-acidic aluminum complexes. This study is part of a collaboration involving **Dr. Chris Schaller** and investigators at the University of Minnesota. **Abdinisir Abukar '11** worked in the CSB/SJU chemistry stockroom with **Nikki Jochman**, and also provided support in the research labs. **Mardi Billman '11** and **Charlie Swanson '11** worked with **Dr. Brian Johnson** on synthetic model compounds for copper-containing proteins such as multicopper oxidases. These important proteins are involved in the reduction of atmospheric oxygen to water, but because these materi-

als are difficult to study, small model compounds can offer important insight. **Michael Burgmeister '11** worked on development of labs for general chemistry with **Dr. Brian Johnson**. **Lindsey Firman '11** investigated the stereochemistry of the Barbier-Prinz reaction, a tandem reaction leading to the formation of tetrahydropyranose rings. Lindsey worked under the guidance of **Dr. Kate Graham** and **Dr. Nicholas Jones**. **Tim Juba '11** and **Zach Lauer '11** worked with **Dr. Mike Ross** on the photodecomposition of antidepressants, specifically Seroquel and Venlafaxine. The decomposition of pharmaceuticals after they enter the wastewater system is considered a potentially serious environmental problem. Ross and other workers have been trying to determine how long these compounds last in the environment and what secondary compounds they give rise to after decomposition. **Nate Louwagie '11** worked under the supervision of **Dr. Henry Jakubowski** to investigate the inhibitory effects of a number of compounds on low molecular weight protein tyrosine phosphatase (LMW-TPT). LMW-TPT plays an important role in cell signaling; over-expression of LMW-TPT has been linked to certain cancers. **Hang Zhang '11** spent the summer working in the Chemical Engineering Department at Zhengzhou University, China. She assisted with work on the synthesis of ATBC, an environmentally friendly PVC plasticizer, and on the production of gemini surfactants (surfactants with two polar and two non-polar groups, which show higher activity than regular surfactants).



Anne Hylden
Senior Chemistry Major



Daryl Fields
Senior Biochemistry Major

Save the Date!

The annual CSB|SJU Celebrating Scholarship and Creativity Day will be held April 28, 2010. We hope you can join us!



Stephanie Roe, Senior Chemistry Major, working in the dry box.

The Cavendish Chronicle

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Dean's List

Congratulations to the following chemistry and biochemistry majors, who made the dean's list in spring, 2009: **Jeff Bandar '09**, **Kati Hromatka '09**, **Zach Shaheen '09**, **Kevin Bettendorf '10**, **Kate Hartjes '10**, **Lindsey Firman '11**, **Sara Kokkila '11** and **Jake Petersburg '11**.

Grad Launch

A look at where our 2009 chemistry and biochemistry graduates are now.

Serina Aubrecht is working as an analytical chemist.

Jeff Bandar is starting graduate work in organic chemistry at Columbia University. Jeff previously completed a summer undergraduate research internship at Columbia in 2008. Jeff's work will be supported by a National Science Foundation Graduate Fellowship and a National Defense Science & Engineering Graduate Fellowship. **Kerry Bauer** is pursuing graduate studies in biochemistry at the University of Notre Dame. **Sarah Demarais** is taking a year off and applying to pharmacy school. **Kati Hromatka** is studying at Creighton University School of Medicine. **Ben Krage** will be attending Des Moines University and is looking forward to studying in the Osteopathic Medical program. **Brad McGuire** is working as an electrician for his dad.

Ben Murray is at Surmodics, Inc. in the analytical research department. His main focus is on HPLC, but he has also undergone training on many other instruments and analytical methods used at Surmodics to study drug elution and content.

Beth Nomeland is taking a year off school and applying to pharmacy programs. **Ha Pham** is attending graduate school at Carnegie Mellon University in Pittsburgh. **Zach Shaheen** is working toward an M.D. / Ph.D. in the Medical College of Wisconsin's Medical Scientist Training Program, with a probable focus in either Biochemistry or Community and Public Health. **Valerie Steinman** took a break from her job hunt to prepare for the arrival of her baby, Noah Michael Watrud, born July 8, 2009. **Sam van Wechel** is working at Innovis Hospital in Fargo, ND. She plans to apply to graduate school this year to pursue a degree in public health.

Alum Notes:

Short Reports From Past Graduates

Theresa Abraham '02 has graduated from the Ph.D. Program in Cancer Biology at the University of Wisconsin, Madison, where she studied the genetics of the human Hepatitis B virus. She is currently doing post-doctoral work in the Department of Microbiology and Immunology at Stanford University. Her new focus is on the effect of intracellular distribution of miRNAs on miRNA-mediated gene regulation.

Jennifer Klein '02 has accepted an NIH postdoctoral fellowship through the National Institute of Aging to study the relationship between oxidative stress and protein structure and function, with an ultimate goal of developing treatments for related diseases. Jennifer recently completed graduate work on the structural dynamics of myosin in the department of Biochemistry & Molecular Biology at University of Minnesota. In addition, her daughter, Aya, is now a wildly developing toddler who "continually reminds me of the joy of learning new things".

Rachel Wermager Rajdl '05 has graduated with a doctorate in pharmacy from Palm Beach Atlantic University in Florida.

Jeremiah Scepaniak '05 was the lead author on a paper in *Angewandte Chemie (Angew. Chem. Int. Ed. 2009, 48, 3158-3160)*. The report on formation of ammonia from an iron nitride complex presents a partial model for the enzyme nitrogenase, which converts atmospheric nitrogen into ammonia. This study was part of Scepaniak's graduate work under Professor Jeremy Smith at New Mexico State University.

Zeljko Ostojic '08 was among the co-authors of an article published in the *Journal of Heterocyclic Chemistry (J Heterocycl Chem 2009, 46, 540-543)*, based on work at Southwest University in Beibei, China, as part of an exchange program with CSB/SJU. Other co-authors included **Dr. T. Nicholas Jones**, Zeljko's research advisor at CSB/SJU, and **Wu Ting-Ting**, who visited CSB/SJU in the exchange.