

## Department Highlights

- Twelve Juniors and Thirteen Seniors are Chemistry Majors This Year.
- Nine Juniors and Ten Seniors are Biochemistry Majors in a Joint Program with Biology.

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# The Cavendish Chronicle

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## What I Did On My Summer Vacation...

*Internships, Research Fellowships, and Other Ways Chem & Biochem Majors Expanded Their Horizons During Break*

### Research in Ardolf Science Center

Katie Hartjes '10 and Brad McGuire '09 both worked on the synthesis of model compounds for multicopper oxidases under the direction of **Brian Johnson** of the chemistry department.

The multicopper oxidases are a class of enzymes containing a unique arrangement of three copper atoms that couples the oxidation of various substrates with the conversion of



McIntosh, Hogerton, Roe and Hartjes in Ardolf Lab.

oxygen to water. Examples of this class of proteins include ascorbate oxidase and

laccase, found in various plants, fungi and microorganisms. Because enzymes are large and complex molecules, it is hoped that smaller compounds containing a similar arrangement of copper atoms can give insight into structural and mechanistic details in these systems.

**Amy Hogerton '10** and **Hadley MacIntosh '10** were partners in two research projects at CSB/SJU. One was a collaboration with **Avinaj John '09** and **Jayne Byrne** of the Nutrition Department studying the omega-3 fatty acid content of eggs from free range chickens. In a second *(continued page 2)*

## “Doctor Bob” Fulton is Professor Emeritus

Bob Fulton came to CSB/SJU in 1969 fresh from a post doctoral experience at Los Alamos National Laboratory. Prior to that he had earned a B.A. in chemistry from the University of Minnesota at Duluth, and a Ph.D. in analytical chemistry from the University of Minnesota.

In 39 years at CSB/SJU, Bob distinguished himself in all facets of academic life: teaching, advising, research, and service to the department and university. He

chaired the chemistry department for five years in the late 70s and early 80s, coordinated the transition to our previous core curriculum, and served on numerous campus-wide committees dealing with academic standards and priorities.

In mid-career Bob's research interests shifted from analytical chemistry to chemical pedagogy. He was an early and enthusiastic proponent of the active learning movement and frequently presented the results of his pedagogical research at re-

gional and national conferences. Locally he has been active in the Learning Enhancement Service and generous in his willingness to mentor junior faculty members.

Excellence in teaching is of preeminent importance at CSB/SJU and Bob Fulton is considered by all to be a master of the craft. This has been acknowledged frequently by Bob's current and former students, and formally in 1987 when he was awarded the Burlington Northern Faculty Achievement Award.

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Dr. Bob Fulton

## What I Did This Summer (continued from page 1)



Anne Hylden with PNNL Geochemist Chris Brown.

The exchange between CSB/SJU and Southwest University pairs American and Chinese research students

Hlavacek and Yang Lin in ASC Biochem Lab



project, Amy and Hadley undertook contract work for a private firm interested in developing a less expensive method of oxidizing a key starting material for their line of commodities chemicals. Amy and Hadley worked under the joint supervision of **Kate Graham** and **Nicholas Jones** of the chemistry department.

**Stephanie Roe '10** worked with **Chris Schaller** of CSB/SJU chemistry on Lewis acidic metal complexes that act as polymerization catalysts. Stephanie bound N-heterocyclic carbenes to metals such as aluminum and zinc. She then used these metal complexes to turn cyclic esters into biodegradable polymers.

### Research Exchange Program with Southwest University, Beibei, China

Three students from CSB/SJU spent part of their summer in a lab in China and part of their summer in Ardolf Science Center.

This research exchange was developed in an effort led by **Henry Jakubowski** of the chemistry department. Now in its third year, the program is currently coordinated by **Bill Lamberts** of the biology department.

**Rob Hlavacek '09** and **Yang Lin** of SWU undertook a kinetic investigation of Tyrosine phosphatases, enzymes that are important in cell signaling because they control the activation of a number of tyrosine-containing proteins. Working with **Henry Jakubowski** of the chemistry department, Rob studied wild-type and several mutant Tyrosine phosphatases to confirm competitive inhibition of phosphorylation by phosphate, an initial step in developing a rational synthesis of inhibitors for these proteins.

**Ben Krage '09** investigated the long-term fate of Effexor, an antidepressant that has been found in relatively high concentrations in municipal waste streams. Ben was able to show that the compound, also called venlafaxine, decomposes in sunlight to give a stable product, not yet identified. Ben's coworker, SWU's Min Zheng, did some similar work to establish the half-life of bupropion hydrochloride in lake water. This work was done under the direction of **Mike Ross** of the chemistry department.

**Samantha van Wechel '09** worked with Yao Haoyi of SWU on the total synthesis of pacifigorgiol, a natural product of a Pacific sea fan that is toxic towards fish. Synthetic quantities of the material are of interest in order to study the mechanism of its biological activity. Samantha worked with

**Nicholas Jones** of chemistry on the project.

### CSB/SJU Students in Research Efforts Nationwide

**Andrew Aebly '10** worked in the laboratory of Mary Cloninger of Montana State University on a collaborative project with **Nicholas Jones** of CSB/SJU. Andrew was working to incorporate catalytic sites inside dendrimers, which are large, highly-branched, very porous polymers with controlled shapes. In essence, the aim of the project was to mimic enzymes by placing a reactive site such as a metal complex or a hydrogen-bonding organic catalyst inside a protective shell.

**Jeff Bandar '09** worked on organic methodology development in the Lambert lab at Columbia University. Jeff developed the first examples of Lewis acid catalyzed decarboxylations of beta-lactones to form olefins. This approach could become a widely used method for synthesizing olefins because of good regiochemical control, mild reaction conditions and commercially available starting materials.

**Anne Hylden's '10** internship at Pacific Northwest National Laboratory allowed her to participate in an assessment of environmental remediation efforts at the Hanford Nuclear Site, where plutonium has *(continued page 3)*

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an assessment of environmental remediation efforts at the Hanford Nuclear Site, where plutonium was produced during WWII and the Cold War. Anne found that microwave digestion of soil samples followed by treatment with an ion-exchange resin was more effective at removing Technetium-99 than simple extraction with either water or acid.

**Ha Pham '09** was accepted into the summer research program at Louisiana State University, where she used a newly developed mode of atomic force microscopy called magnetic sample modulation (MSM) to study Fe<sub>3</sub>O<sub>4</sub> nanoparticles on a mica surface. Ha prepared her samples using lithographic techniques that allowed her to lay down the nanoparticles in an array of rings, like a honeycomb, and confirmed this morphology using MSM.

**Valerie Steinman '09** had a summer research position at the Hormel Institute in Austin, MN. The Hormel Institute is affiliated with the University of Minnesota. Valerie worked in a

cancer biology lab primarily doing protein crystallography on protein kinases, mainly with ERK-1 and RSK2-CTD. With this work she hoped to determine the three dimensional structure of these complex macromolecules.

## Getting Started in Industry

**Beth Nomeland '10** worked in the forensics processing lab at Medtox Laboratories in New Brighton, MN. Beth was responsible for preliminary testing on urine samples and GC-MS to confirm and quantify substances detected in the samples. Beth's lab handled 8,000 to 15,000 samples per day with the help of automated systems for preliminary screening. Beth says of her experience at Medtox: "If someone is looking for industrial experience, it's definitely a way to get your feet wet!" The company (<http://www.medtox.com/>) also has cytology, pathology, molecular and clinical departments working with blood, meconium and plasma samples.

## A Summer in the Stockroom

**Mark Bergstrand '09** was a stockroom worker in the Ardolf Science Center this summer. An avid tennis player, Mark sacrificed countless hours of balmy, cloudless playing time for the good of his fellow students. Mark's duties included developing experiments for general chemistry lab and preparing samples for organic and general chemistry.



## Fulton (from page 1)

Dr. Bob is now Professor Emeritus. We hope that he will find time to visit the department to let us know what he's been up to. Some of that, of course, we can figure out for ourselves – relaxing at his lakeside home, fishing, traveling with Jackie to visit the kids and grandkids, more fishing ...

*Nomeland: "If someone is looking for industrial experience, it's definitely a way to get your feet wet!"*

# Biochemist is New Chair in Chemistry

**Henry Jakubowski** is the new chair of the chemistry department, replacing **Anna McKenna** after her six-year tenure in the position. Jakubowski was previously interim chair of the department during **Brian Johnson's** sabbatical in 1999-2000.

Jakubowski is a native of upstate New York who attended SUNY Albany, obtaining a degree in chemistry, and did summer work at Kodak in Rochester, NY. His Ph.D. studies in biochemistry at the University of Iowa involved enzyme kinetics work with thrombin. This work was followed by a post-

doctoral appointment at the Mayo Clinic.

Jakubowski's current research interests focus on the role of protein tyrosine phosphatases in signal transduction in cells. His former undergraduate research students include a number of physicians and Ph.D. scientists as well as people in other health-related professions.

Jakubowski's teaching responsibilities have included biochemistry, general chemistry, chemistry for nursing and nutrition majors, and medically-oriented natural science courses. His biochemistry web book has been cited in *Netwatch*

in *Science* magazine. He has also been involved in the CSB/SJU study abroad program at Southwest University (SWU) in China, where he has taught both CSB/SJU and SWU students. In 2006 he established the twelve week Summer Science Research Exchange Program between SWU and CSB/SJU in which CSB/SJU and SWU students pair up to conduct research at both institutions.

Jakubowski's goals as chair include a revision of the chemistry curriculum to fit new recommendations from the American Chemical Society.

*Jakubowski has taught biochemistry, general chemistry, and chemistry for nurses and non-science majors*

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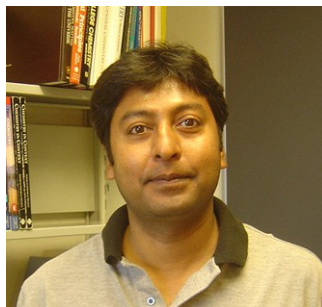
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Saint John's University

# New Faculty in Chemistry

**M. Abul Fazal** has been hired as a tenure-track faculty member. Fazal earned a B.Sc. from the University of Dhaka in Bangladesh, followed by a M.S. from University of North Dakota and a Ph.D. under Norman Dovichi at Washington University in Seattle. He then did post-doctoral work with neurochemist Michael Bowser at the University of Minnesota.



Dr..M. A. Fazal

Fazal's teaching responsibilities will include analytical chemistry and general chemistry. In addition, he will be working with

undergraduate research students at the interface of chemical analysis and biology. His research will focus on the development of simple, fast, and ultrasensitive assays for minute amounts of samples of biological, clinical, and environmental significance.

In addition, two adjunct faculty members will act as sabbatical replacements for **Ed McIntee** and **Anna McKenna**. **Alison Johnson** will be teaching general chemistry. She earned her B.S. from the University of North Dakota and Ph.D. under Larry Dahl at the University of Wisconsin Madison. A former member of the St. Cloud State chemistry department, she holds a DVM from University of Minnesota and practices veterinary medicine part time. **Rex John** earned her B.Sc. from Sardar Patel University and Ph.D. in polymer chemistry from Gujarat University in India. She will be teaching general and organic chemistry.

## Alum in State Lab

Glenise Johnson '06 has started in a new position as an HIV epidemiologist at the Minnesota Department of Health. Johnson has just finished a master's degree in Public Health from the University of Minnesota. Originally from Jamaica, Johnson grew up in Nassau, Bahamas, before coming to CSB/SJU for college. Her undergraduate experience included a summer working in the Ardolf stockroom.

# Parting Glances: Where Have Grads Gone?

*Chemistry and Bio-chemistry '08 Seniors: Notes on Post-Graduate Plans*

## Going to Graduate & Professional School

**Carly Andresen** and **Alison Thorsness** have entered graduate school in chemistry at the University of Minnesota. **T.J. Nelson** will go to North Dakota State University's graduate program in polymers and coatings.

In the health professions, **Maggie Sweeney** is headed to

Creighton for medical school and **Justin Wilkes** will enter medical school at the University of Iowa. **Tony Wieland** is going to pharmacy school at North Dakota State University.

## Taking a Gap Year

**Jessica Dahlheimer**, **Andrew Hipp** and **Jackie Hoeft** are working for a year or two before applying for medical school. **Dan Klein** and **Nathan Sandquist** are working for some additional experience before they apply to graduate school. **Zjelko Ostojic** will work for a year or two in Bosnia and attend graduate school in Europe.

## Heading to Industry & Medical Labs

**Andy Baltes** has a position at Pace Analytical. **Rich Lahr** will be working in the drug & toxicology lab at the Mayo Clinic.

## Service and Other Variations

**Jessica Heasley** is working at the Science Museum of Minnesota while applying to medical school. **Jacob Hvidston** is an English teaching assistant in Okinawa, Japan. **Bruce Walkley** is volunteering at Camphill Village, a community for adults with disabilities.