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FoCuS Grant Provides New Scholarships

The National Science Foundation has awarded a grant for \$600,000 to the chemistry department for a new scholarship program, Future Chemists Scholarship and Support. Students who are accepted into this program will receive a scholarship of \$18,500 a year, renewable up to four years. This select group of students will gain mentoring, academic, leadership and research experiences to help prepare them for science careers.

This award represents the largest grant ever received by the College of Saint Benedict.

The program will begin in the summer of 2012. It builds on a similar program in mathematics, computer science and physics, called Mapcores, offered at CSB/SJU for the past couple of years. **Dr. Kate Graham** was the Principal Investigator on the new award.

FoCuS students will enroll in their first chemistry class (Chem. 125, Structure and Properties in Chemistry) and laboratory (Chem 201, Purification and Structure I) during the summer between high school and college. The goals of this six week summer bridge program are several fold, but with an emphasis on smoothing the transition into college. Students will take their first chemistry class in a small setting with extra time to build a relationship with the instructor. The students will also participate in academic and social activities with their cohort to develop an early sense of community.

Since the FoCuS students will have completed the first semester of the chemistry curriculum during the summer, they will be offered work-study positions as Teaching Assistants (TAs), tutors or stockroom assistants. This is

a leadership opportunity for which first-year students usually are not eligible. TAs will have an added opportunity to develop a relationship with the faculty member teaching the course. "Our goal is to improve their confidence and familiarity with chemistry as well as to develop a sense of membership in the Chemistry Department," Graham said.

As students move through their undergraduate career, they will have the opportunity to take part in a Problem Solving Seminar, then a career exploration in the junior year, and finally a Senior Research Project in the senior year.

More information, as well as application materials, are available on the chemistry department website at <http://www.csbsju.edu/chemistry>.

NSF-TUES Funds Chemistry Program

The CSB/SJU Chemistry Department has received a grant from the National Science Foundation for \$199,632. These funds will be used to support ongoing curricular changes in the department.

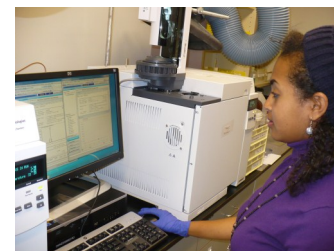
The award resulted from an application to the Transforming Undergraduate Education in Science (TUES) Program. About 100 such awards were made nationwide this year; recipients were chosen from a pool of nearly a thousand applicants, representing a funding rate of

11%. A number of department members collaborated on the proposal, with **Dr. Chris Schaller** acting as Principal Investigator.

A few years ago, the American Chemical Society (ACS) Committee on Professional Training (CPT) revised its guidelines for departments receiving ACS accreditation. Included in this revision was a directive that departments should offer the equivalent

of five "foundation" courses in the sub-disciplines of chemistry: inorganic, organic, analytical, physical and biochemistry; plus

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Hamrawit Tebeka '15 with a new Agilent GC 7820

Alum Notes

Short Reports From Past Graduates



Daryl Fields (left) in a UW-Madison photo

Huong (Nguyen) McLean '00 had a baby, Dahlia Mai McLean, born February 20, 2011. She weighed 7lbs 14oz and was 19 3/4 inches long. So far she is a happy baby who eats and sleeps well. McLean works at the U.S. Centers for Disease Control and Prevention.

Williamson Oloo '05 has earned a Ph.D. in chemistry while working under Dr. Andrei Vedernikov at the University of Maryland. He has started post-doctoral research in bioinorganic chemistry with

Dr. Larry Que at the University of Minnesota.

Jeremiah Scepaniak '05 has obtained his Ph.D. in chemistry while working in Dr. Jeremy Smith's lab at New Mexico State University. He is continuing research on high valent iron complexes in a post-doctoral position with Dr. Trevor Hayton at the University of California, Santa Barbara.

Joel Anderson '10 is in the Ph.D. program in Environmental Engineering at the University of Cincinnati. Prior to that, he worked as a lab technician

in the Vehicle Care Division at Ecolab, running a variety of analyses on new components before they were introduced into commercial products.

Daryl Fields '10 took on a summer research internship at University of Wisconsin-Madison Medical School. He is in his second year of study there.

Anne Hylden '10 has entered graduate school in chemistry at the University of Pennsylvania. Prior to that, she held an internship at Pacific Northwest National Lab.



Krista Barzen-Hanson

Junior Wins NASA Fellowship

Krista Barzen-Hanson '12 has been selected as a 2011 - 2012 NASA Motivating Undergraduates in Science and Technology (MUST) Scholar. The award, bestowed by the National Aeronautics and

Space Administration (NASA) and the Hispanic College Fund, includes a scholarship of up to \$10,000 per academic year. The award also included participation in the MUST Orientation and Leadership Sympo-

sium, held July 20-24, 2011 in Baltimore, MD. In addition, Barzen-Hanson will have the opportunity to participate in a NASA internship in summer 2012.



McIntosh on board the R/V H.R. Sharp on the Delaware Estuary

Alumna Earns Graduate Scholarship

A CSB/SJU alumna has been selected for a student achievement award based on work done during her first year of graduate school.

Hadley McIntosh '11 is in the master's program at Virginia Institute of Marine Science (VIMS), College of William and Mary. McIntosh received the Craig L. Smith Memorial Scholarship for a combination of high academic

performance and research progress.

Described in an announcement from VIMS as "every advisor's dream student", McIntosh was cited for her creativity, scholarly work and positive attitude on ocean-going research trips. The announcement goes on to cite her "challenging Master's project" using lipid biomarkers and radiocarbon isotopes to

investigate "the processes controlling the cycling of carbon pools of different ages and sources, and their delivery to the coastal ocean". With this initial recognition and, as McIntosh herself puts it, "several research cruises and thousands of liters of filtered water later", she is well on her way to becoming an excellent researcher in environmental and marine science.

Summer Research in Ardolf

A number of CSB/SJU chemistry and biochemistry majors spent the summer doing research in Ardolf Science Center. Topics ranged from nanotechnology to medicinal chemistry and beyond.

Nanotechnology aims to exploit very small materials to carry out a wide array of applications. The synthesis of nanoparticles was the topic of a study carried out by **Redmond Fraser '12** under the direction of **Dr. Leo Seballos**. He investigated the controllable growth of silver nanoparticles in reverse micelles as well as the effect of an ionic liquid, BMIm-BF₄, on the growth of these nanoparticles. The researchers are continuing to investigate the effects of a series of other ionic liquids on nanoparticle growth.

The rapidly developing field of nanotechnology has led to a need for toxicological assessments. **Krista Barzen-Hanson '12** and **Valdez Rahming '12** studied this area under **Dr. M. Abul Fazal**. These students investigated the interaction of iron (III) oxide magnetic nanoparticles (MNPs) with two abundant human blood proteins: fibrinogen and human serum albumin (HSA). The interactions of MNPs with fibrinogen and HSA were analyzed using a range of spectroscopic techniques, such as fluorescence spectroscopy and dynamic laser scattering spectroscopy. Results from this work will contribute towards a comprehensive understanding of MNP-protein interactions under normal and oxidative stress conditions.

In addition to the nanoparticle research described above, research in the department dealt with other environmental issues. These projects involved aspects of environmental monitoring as well as remediation. **Moses Adeagbo '12** worked with **Dr. Kate Graham** and **Jayne Byrne** of the nutrition department in an analysis of heavy metals in chicken eggs. Heavy metals are common environmental contaminants that can accumulate in organisms.

Kate Kaiser '13 joined **Mikala Foehebnacher '12** on a project

involving the dehalogenation of chlorinated organic solvents. Dechlorination of these compounds renders them less hazardous. Working under the direction of **Dr. Alicia Peterson**, these students hope to develop a catalytic method that would efficiently dehalogenate compounds in groundwater samples.

Other researchers delved into studies of biomolecules. Several students focused on studies of Low Molecular Weight Protein Tyrosine Phosphatase (LMW-PTP), a positive regulator of tumor growth which is thought to contribute to the spread of cancer. **Nick Peterson '12** and Chen Tian (Southwest University, China) worked under the direction of **Dr. Henry Jakubowski** on development of affinity chromatography resins for purification of the target proteins. In addition, they worked to develop 2D protein gel techniques to determine protein targets of PTP in control and platelet-derived growth factor stimulated NIH-3T3 cells.

Shirin DeSouza '12 also worked in this area in collaboration with **Dr. Ed McIntee**. Her study involved the synthesis of potential inhibitors for LMW-PTP. These potential inhibitors are chosen based on their resemblance to pyridoxal phosphate (PLP). After synthesis, DeSouza conducted enzyme activity assays and computational analysis to determine the compounds with the greatest competitive inhibition promise through a comparison of the K_{15} values. In another related project, **Christine Lucachick '12** worked on synthesizing novel inhibitors of LMW-PTP that would take advantage of the main binding motifs of PLP, but would additionally branch out and bind to an ancillary binding pocket near the active site.

In a McIntee-Jakubowski collaboration, **Chris Seiler '12** undertook a computational assessment of compound databases, NCI diversity set II and Drugbank. The compounds in the database were docked to the protein using software at the Minnesota Supercomputing Institute. Promising com-



Researchers in the Great Hall, SJU

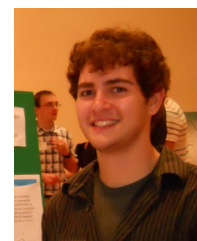
pounds were tested in a micro assay to assess their inhibition of the protein.

In a study with potential pharmaceutical applications, **Danelle Rolle '12** worked with Dr. Graham and **Dr. T. Nicholas Jones** on the synthesis of a 1,2-amino alcohol via a catalyzed epoxide ring opening. The synthesized 1,2-amino alcohol can potentially act as an analog for known drugs used against *Giardia intestinalis*, a parasite that causes diarrheal illness. Developing a sound methodology for making these types of compounds would help researchers to develop new anti-parasitic drugs.

Other methodology studies were of a more basic nature, simply seeking new ways of making structures. **Eric Uzelac '12** worked with Dr. Jones on Lewis acid-promoted cyclization of 5-hexynoyl chloride and its application to the synthesis of dihydropyranones. During the course of this work additional Lewis acids were screened for their ability to promote cyclization. Results of this study were featured in a recent publication (Hylden, A. T.; Uzelac, E. J.; Ostojic, Z.; Wu, T-T; Sacry, K. L.; Sacry, K. L.; Xi, L.; Jones, T. N.* *Beilstein J. Org. Chem.* **2011**, *7*, 1323-1326).

Jen Marple '13 also worked with Dr. Jones on the application of the alkynoic acid cyclization to the preparation of indolizidine-related compounds. So far, this work has involved the synthesis of cyclization

Topics from nano-technology to medicinal chemistry



Eric Uzelac

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A Long Journey, Worth Every Minute



Elizabeth Nessel

“St. Ben’s was the perfect environment to figure who I was and what path I should take in life.”



Nessel working in Vietnam

Elizabeth Nessel ’99 wanted to be a doctor from the age of 5. That dream has carried her from her hometown in rural Minnesota, to one of the most famous medical institutions in the world, to her current position serving the uninsured and underserved population of Maricopa County, Arizona. “I absolutely love what I do,” Nessel said recently, citing “the people I work with, the patients I have the opportunity to help and the students who are excited about what I do. Each one of them teaches me something in return.”

Nessel is part of a large (300 plus), multi-specialty physician group in Phoenix, where she is an Attending in Plastic Surgery with District Medical Group and Maricopa Integrated Health System. She was fortunate enough to join her surgical mentor in practice there after a fellowship at the Mayo Clinic. Her practice is 100% reconstructive: dealing with facial trauma and other severe injuries, both acute and late burn reconstruction, skin cancer removal, breast reconstruction, wound care, and microsurgery. In addition to working with patients, she teaches medical students, residents and fellows who are making their own way in medicine and surgery. She also participates in service trips, such as a recent sojourn in Vietnam to repair cleft palates in children.

Her time at St. Ben’s made possible everything that was to

follow. “I was a bit of a lost soul when I began college, but St. Ben’s was the perfect environment to figure who I was and what path I should take in life.”

That isn’t to say Nessel ever lacked ambition or courage. “I am fairly certain that, given a tiara and a cape, I could save the world,” is one of her favorite quotes. She has a sparkle in her dark eyes and a winning smile that makes you think she just might do it, too. That can-do attitude extends into her leisure activities, such as a recent sky-diving excursion.

Nessel tends to throw herself enthusiastically into whatever is demanded of her. That included her studies of chemistry at CSB/SJU. She was a teaching assistant in Father (now Abbot) **John Klassen’s** organic chemistry lab, as well as a tutor for general chemistry and nursing students. She ran NMR analyses on literally thousands of lab samples, providing students with data for their lab reports (this was before the department had an autosampler to run spectra). She participated in two summers of undergraduate research, making highly air-sensitive transition metal complexes. After graduation, before heading to medical school in the fall, she squeezed in a job as a lab tech in a water and soil testing lab in her hometown.

“Chemistry, in particular, has proven to be invaluable in my training and work,” said Nessel. “Of course, chemistry is everywhere if you look hard enough

– especially in medicine.” Although her chemistry degree demanded a lot of hard work compared to other majors, Nessel feels it is part of what made her who she is today, and that it was crucial to her success in medical school and her residency. “The greatest skill I learned in Ardolf Science Center was problem solving and critical thinking,” she said. “Every class helped me to develop the skills necessary to look at a problem, break it down and find a solution.”

At the same time, Nessel said, the bonds forged during that intense academic experience were life long. “Our Ardolf crew was a little like a family – always the same people in the computer lab, in the lounge, in the lab.” She also talks warmly about a strong mentoring relationship that developed with **Dr. Brian Johnson**, her academic advisor.

After attending the University of Minnesota – Duluth School of Medicine for two years of classroom work, she spent her third year in New Ulm, MN, in the Rural Physician Associate Program. That experience settled the course of her career. “I fell in love with surgery during my time in New Ulm,” she said, “from the first moment someone handed me a scalpel and let me make an incision.” She then finished at the University of Minnesota Medical School, followed by a General Surgery residency at the Mayo Clinic. That experience, in turn, led to a Plastic Surgery fellowship at Mayo.

Continued next page

Nesset: Driven by Passion for Life and Medicine

Continued from previous page

It took four years of undergraduate work, four years of medical school, five years of General Surgery and two years of Plastic Surgery fellowship to get where she is today. While 15 years of training may sound daunting to someone just beginning to think about a career in medicine, it is absolutely worth it, says Nesset. "It requires time and sacrifice, but I wouldn't change a thing."

Her final advice to students: "Figure out what you love – something you are truly passionate about. If you can find a way to turn that into a profession, you will never work a

day in your life." She also encourages those students interested in medicine to reach out to people in the field as early as possible. Most people truly enjoy talking about what they do and getting someone else excited about what they are passionate about. "Call! Write!" she exhorts students at CSB/SJU. "I'm happy to chat with anyone about medicine, medical school, surgery, residency, any of it."

Given that full-speed-ahead enthusiasm, Nesset is likely to have an impact on future doctors for years to come.

Research Program

Continued from page 3

substrates, with more studies to follow.

In another basic study, **Haosen Wang '13** worked with **Dr. Chris Schaller** on reactions of transition metal compounds with organomagnesium halide reagents. This reaction is a common method for adding organic fragments to transition metals, but sometimes the halogen is donated instead. Wang hopes to gain insight into factors that make the reaction go one way or the other.

Summer research participants often go on to graduate school in areas such as chemistry, biochemistry, materials science, forensics and public health. Alumni frequently cite the crucial role played by the program in developing their approach to problem-solving.



Haosen Wang



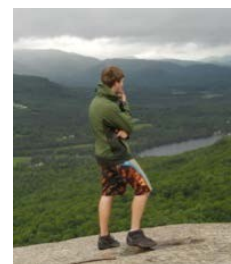
Days of Summer 2011: What Students Did While on "Vacation"

Joe Gair '12 did research at Hope College. He worked on a nickel-mediated addition of organozinc to phthalimides. Joe was able to get the reaction to work catalytically. He also explored new applications of the method. **Jill Kerrigan '12** did environmental research in the Civil Engineering Department at the University of Minnesota. She studied the photodecomposition of 6-OH-BDE 90 in buffered waters, Mississippi River water and Lake Josephine water, with special attention to the formation of dioxin as a photoproduct. **John Madison '12** edited a book on post-traumatic stress disorder, worked at Subway and began planning for his summer 2012 wedding. **Breanne Mordorski '12** did research with Jen Schaefer in CSB/SJU Biology, studying how the fruit fly's nervous system controls crawling. In addition to video analysis of crawling behavior, she used genetics and immunocytochemistry to fluorescently label motor

neurons and track them throughout development. **Abi Passe '12** worked as a lifeguard at a swimming pool and as a CNA at a nursing home. She also studied for the PCAT. **Omar Abdullahi '13** participated in "Mayo Physicians of Tomorrow", a program involving workshops, seminars and physician shadowing at the Mayo Clinic. He also volunteered at Midway Clinic in St. Paul. **Ansenio Gibson '13** worked in the CSB/SJU chemistry stockroom. **Beth Grega '13** worked in Biochemistry at University of North Dakota. Research in the Colbert Laboratory focuses on the molecular mechanisms of metal trafficking. Beth used a combination of structural (X-ray crystallography and NMR spectroscopy) and biochemical techniques (protein chromatography, mutagenesis, spectroscopy, etc.) to address basic questions about how proteins facilitate and regulate the import and utilization of iron in cells.

Erin Karl '13 worked in the clinical lab at the Mayo Clinic. She prepared urine samples for analysis by mass spectrometry, using a preparative procedure that involved acid-base extraction. **Chi Le '13** worked in the CSB/SJU chemistry stockroom. **Chris Moore '13** did an internship with Medtronic. **Daniel Neuburger '13** interned at Fluidic Energy in Scottsdale, AZ. He worked as a lab tech preparing and testing rechargeable Metal Air Ionic Liquid (MAIL) batteries via various electrochemical techniques. Though the battery is still in its early development, several breakthroughs were made which led the MAIL battery research team towards a production-ready product. **Matthew Syverson '13** was a rock climbing guide at Indian Head camp near Honesdale, PA, at the edge of the Alleghenies. **Andre Washington '13** worked in the CSB/SJU chemistry stockroom.

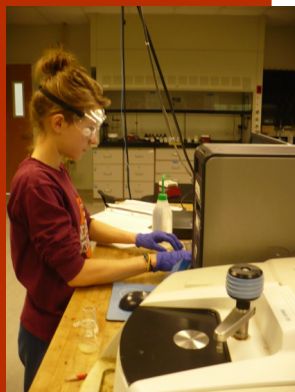
Research, rock-climbing, internships and more.



Matt Syverson

Funding Supports New Labs, Course Development

Continued from first page



Bailey Drewes '15 obtains an IR spectrum

A foundation-level sequence in structure—reactivity relationships



Kelly Hanlon '15 takes a melting point

additional “in-depth” courses. The traditional general chemistry course would not be part of this foundation, although departments could offer one or two semesters of entry-level chemistry as needed. CPT also encouraged departments to be innovative and to try new approaches that reflect how chemistry is practiced in research and industry.

CSB/SJU Chemistry responded with a plan to build the foundation on a one-semester course in structural chemistry. This course begins with a brief examination of atoms and continues with an exploration of the structures of ionic compounds and molecules. Additional attention to stereochemistry and conformation follows, as well as the properties of ionic and molecular compounds and structure-property relationships in acids and bases. This course, Chem 125, is now in its third year.

Meanwhile, the second phase of innovation, funded by the TUES grant, will combine aspects of organic, biological and inorganic chemistry into three courses based on themes of reactivity. The first course, Reactivity 1, focuses on the reactivity of the carbonyl unit because of its prevalent role in biochemistry. Parallels are also drawn with transition metal catalysis involving carbonyl ligands. In the second course, Reactivity 2, common themes are drawn between ligand substitution in coordination complexes and nucleophilic substitution in organic compounds. The third course, Reactivity 3, focuses on reactions that do not involve simple Lewis acid / Lewis base interactions, such as radical reactions and redox reactions. This course also

looks at a number of biochemical pathways in the context of material covered in Reactivity 1-3. Reactivity 1 will be offered for the first time in spring of 2012.

Some of the challenges of developing a new curriculum involve the lack of supporting materials for novel courses. Part of the NSF funding is meant to support the writing of new materials in-house. These materials could take the form of workbooks for building concepts in the classroom via guided inquiry and problem solving, following the well-documented success of these methods in chemistry programs across the country in recent years. NSF funds also support the development of a web-based textbook, which is another widespread response to inflexible coverage by textbook publishers. Furthermore, development of online homework problems is included in the funding plan.

In addition to the new lecture courses, laboratory work in organic, biological and inorganic chemistry has also been combined into three new lab courses. Purification 1 and 2 Laboratories deal with standard methods of separating mixtures using non-chromatographic and chromatographic methods, respectively. Synthesis Laboratory deals with making things, from small organic molecules to inorganic coordination complexes to proteins. A significant amount of NSF support has allowed the department to offer first year students exceptional access to instrumentation. In Purification 1, offered for the first time in fall, 2011, students analyze compounds through infrared and NMR spectrometry, provided through previous NSF support, as well as gas chromatography, made possible by the new TUES grant.

Future phases of curricular innovation, beyond the scope of this grant, are already planned by the department. Two foundation courses in physico-chemical analysis with accompanying labs will lay the groundwork for understanding measurement and mathematical models involving energy and equilibria. A number of in-depth courses will provide education in areas such as medicinal chemistry, chemical biology and materials science.

ACS Award to Rahming



Valdez R. Rahming '12 presented his research at the 7th Annual Meeting of Undergraduate Research in the Molecular Sciences at Minnesota State University, Moorhead (October 28 – 29, 2011). The meeting was jointly sponsored by the American Society for Biochemistry and Molecular Biology and American Chemical Society (ACS). The title of his presentation was “Spectroscopic analysis of the interactions between human serum fibrinogen and super paramagnetic iron (III) oxide nanoparticles”. Rahming was awarded one of the two “Best Poster/Oral Presentations” travel awards by ACS Red River Valley Section. With this award (\$ 400), Rahming will present his work at the ACS national meeting at San Diego, CA in spring, 2012.

Funding for Montana State Collaboration

Dr. T. Nicholas Jones is the recipient of a grant from the National Science Foundation that will fund a creative collaboration between liberal arts college students and researchers at a state research institution. The NSF proposal “RUI: Use of Functionalized Dendrimers in Cascade Catalysis” was funded for fiscal year 2011 in the amount of \$42,500.

In this project, members of Jones’ research group will collaborate with Professor Mary Cloninger and her lab at Montana State University for five weeks during the summer. The goal of the research is to functionalize PAMAM dendrimers with catalytic moieties. Access to unique instrumentation and expertise at MSU is an important feature of the project design.

Dendrimers are highly branched macromolecules that radiate from a central core. Their structures are highly porous, and their surfaces can be modified with a large number of different end groups. Over the past



Jones in Ardolf Science Center

two decades, researchers have been exploring a growing number of applications of these unique molecules, including drug-delivery vehicles and light-harvesting antennae. In Jones’ and Cloninger’s study, different molecules known to act as catalysts will be tethered to a dendrimer in an attempt to induce a sequence of transformations on a substrate. The dendrimer would conceivably function as

a molecular assembly line, carrying out a sequence of tasks on this substrate.

Jones is excited about the initial project results that lead to funding. “This work is based primarily on the cascade catalysis developed by Dr. David MacMillan at Princeton University,” said Jones. “MacMillan is a leader in organocatalysis and efficient total syntheses, so it has been nice to see an application where we can put some of that cutting-edge science to work in our own hands.”

The award was funded on a continuing basis, with funding for the 2012 and 2013 fiscal years contingent upon availability of funds and scientific progress. If fully funded over this period, the entire grant will total \$127,500. The grant will support two students and the Dr. Jones during each summer by providing stipends, supplies and travel to Montana State and to American Chemical Society meetings.

Dendrimers, catalysis and more

Professor, Former Student Blaze Parallel Trails

Two scientists with CSB/SJU connections have recently published separate studies dealing with the environmental fates of some common consumer products.

Dr. Mike Ross of CSB/SJU chemistry and collaborators at ETH, Zurich, have published a study on the treatment of triclosan, a common antifungal and antibiotic used in toothpaste and other items (*Chemosphere*, 2011, 85 (2), 284-289).

Triclosan is a halogenated compound, a class of molecules frequently linked to long-term environmental and health problems. The study suggests that although chlorination of wastewater lowers the concentration of triclosan in wastewater, it also

leads to the formation of other chlorinated triclosan derivatives. UV treatment of wastewater does not lead to these derivatives, however, and may be a better option.

One of Ross’ former research students, **Laura MacManus-Spencer**, recently published a study of the photochemical degradation of octyl methoxycinnamate (OMC), a commonly used sunscreen agent (*Environ. Sci. Technol.*, 2011, 45 (9), 3931–3937).

The high volume use of this agent leads to its detection in aquatic environments, including in fish. However, little is known about what other pollutants may result from the breakdown of this compound in the envi-

ronment. MacManus-Spencer, a faculty member at Union College in Schenectady, New York, detected a number of smaller molecules formed from OMC as well as dimerization products, formed when two molecules come together to form one larger molecule.

Both studies reveal important information about the impact of household products on the environment that may lead to improved monitoring and treatment, or even the development of alternative products.

The fates of common household products in the environment





Ardolf Science Center on CSB campus

CSB/SJU CHEMISTRY

Editor: *Chris Schaller*

Additional Credits: *Kate Graham, Alicia Peterson, Nicholas Jones, MA Fazal, Elizabeth Nessel, Hadley McIntosh, Chem & Biochem Majors*

CSB/SJU Chemistry Department
Ardolf Science Center
37 South College Avenue
St. Joseph, MN 56374
Phone: 320-363-5312
Fax: 320-363-5582
E-mail: cschaller@csbsju.edu

The College of Saint Benedict /
Saint John's University

Consortium Gets X-ray Facility

A group of four CSB/SJU alumni are part of a research collaboration that has been rewarded with a grant from the National Science Foundation. The project, which is headed by a fifth collaborator, Dr. Daron Janzon at Saint Catherine University, will fund the establishment of a regional X-ray diffractometry facility at St. Kate's. The project team includes **Steven Drew '85** of Carleton College, **Ted Pappenfus '95** of the University of Minnesota – Morris, **Alicia Peterson '03** of CSB/SJU and **James Wollack '04**, also of St. Kate's.

X-ray crystallography allows for the measurement of distances and angles between atoms in a crystalline solid, providing a three-dimensional picture of a molecule or a crystal lattice. Although the technique has been extensively used in research for a century, the expense of the instrumentation and the time required both to grow good-quality crystals and to collect useful data has limited the adoption of X-ray crystallography at smaller colleges. Recent advances in technology have made it easier to perform analyses, and collaborations allow a number of schools to pool resources in order to access costly instrumentation.

The project team all have very different applications for the instrument. Peterson works on the development of catalysts that will convert environmental toxins into more benign forms. Wollack develops methods of tagging proteins and DNA with small organic molecules needed to study important processes. Pappenfus and Drew work on different aspects of organic and inorganic materials having useful electronic or electrochemical applications. Janzon also works with inorganic materials and provides the project with expertise in X-ray crystallography.

Students and researchers in the consortium may be trained to run their own samples and work-up data, submit samples to St. Kate's and receive raw data for analysis, or submit samples and receive the solved crystal structure.

The grant from NSF's Major Research Instrumentation Fund provides \$201,787 for a diffractometer and a high-quality stereomicroscope for crystal examination and preparation. The instrument, a desktop Rigaku XtaLAB system for single-crystal diffraction, is scheduled for delivery in November.



Grad Launch: Where the Class of 2011 is Now

Abdinasir Abukar is attending graduate school at North Dakota State University. **Mardi Billman** is in the Ph.D. program in chemistry at Colorado State University. **Lindsey Firman** is attending pharmacy school at the University of Minnesota-Twin Cities. **Mike Freeman** is working as a research and development technician at Epitopix in Willmar, MN. **Dustin Hansen** is attending medical school at the Medical College of Wisconsin. **Betsy Hutchinson** is attending the College of Pharmacy at North Dakota State University. **Tim Juba** will be graduating in the fall after completing student teaching. He is teaching general chemistry (11th grade) and physical science (9th) as well

as coaching football at Richfield HS, Richfield, MN. **Benjamin Jagger** is working as a Tech Aide in the adhesives laboratory at 3M. **Sara Kingston** is a healthcare sales and finance coordinator at Biothera in Eagan, MN. **Sara Kokkila** is studying theoretical chemistry in the Ph.D. program at Stanford University. **Zach Lauer** is in medical school at the University of Minnesota-Twin Cities. **Nate Louwagie** is doing battery research at Medtronic. He plans to go to Nepal for volunteer work next summer. **Peter Ly** is volunteering with Teach for America in Detroit and pursuing a graduate degree in education at the University of Michigan. **Malinda Madery** is volunteering through Good Shepherd Vol-

unteers at Collier High School in Wickatunk, NJ. **Colin Owens** is at the University of Minnesota School of Public Health for an M.S. in Environmental Health, focusing on Toxicology. **Jake Petersburg** is a research analyst with Boston Scientific. **Rachel Seurer** is in The University of Iowa Chemistry Ph.D. program. **Steven Sour** is a laboratory technician / analyst at Ecolab. **Charlie Swanson** is a volunteer coordinator for the Benedictine Volunteer Corps in Chicago. **Hang Zhang** is in graduate school in materials science / chemistry at the University of Southern California.