Q-CHeM CHRONICLES

Queen's UNIVERSITY

AUGUST 2013

Professor Andrew Evans Bader Chair in Organic Chemisty

Prof. Evans' research program focuses on the development of new catalytic synthetic reactions, to facilitate the development of creative strategies for rapid construction of complex, bioactive agents.

The development of pharmacologically active agents has never been more important to the quality and longevity of human life. However, the increasing cost of drug discovery, due to the low success rate of clinical candidates progressing through the various phases of drug development (<0.2%), has prompted serious analysis of the factors that contribute to the high failure rate. For example, the average cost to market a new drug is in excess of $1 billion, in which only three out of ten drugs generate enough revenue to cover the research and development costs. Additionally, despite the advent of new technologies, pharmaceutical productivity levels have not dramatically increased over the last decade. This provides an important opportunity for academia to address some of these limitations using collaborative research as a platform for discovery.

Natural products have historically proven reliable lead compounds for drug discovery. For example, these agents have inspired over 60% of the anticancer agents and 70% of the antibiotics entering clinical trials in the last 30 years. Nonetheless, many companies have abandoned natural products due to the perceived problems associated with the preparation of libraries of natural product analogues for detailed structure activity relationship studies. The advent of chemical genetics is exciting for drug development; however, the disconnect between the production of a protein and its function constitutes a considerable "knowledge gap." Hence, the solution of the human genome provides a chemical and biological conundrum, the extent to which has been dramatically underestimated by the pharmaceutical industry.

Evans and his team focuses on the development of new transformations that expedite the construction of hitherto challenging pharmacaphores embedded in bioactive agents. For example, his group has devised a series of atom-economical methods for the construction of polycyclic frameworks that have traditionally been too complicated for medicinal chemistry studies. Indeed, there is now a move away from the so called "flat-land" approach to medicinal chemistry, since a recent study illustrated that the number of sp3-carbon atoms, particularly ones that are stereogenic, and the reduction in the number of aromatic rings correlates with an agent's successful transition from drug discovery to a marketable entity. His work on higher-order carbocyclizations provides the technology to build highly functionalized polycyclic systems in a single operation with complete atom economy. Evans notes that "the key to the group's success in this area is the collaboration with Professor Mu-Hyun Baik at Indiana University," who is a theoretical chemist that enables him to more deeply understand these sophisticated reactions. In a related area, Evans and Inglesby, a former postdoctoral associate, have devised a scalable five-step synthesis of the neuroexcitatory amino acid, (−)-α-kainic acid. This agent is an important tool for Alzheimer's research, since it induces seizures in experimental animals, which enables the efficacy of potential new drugs to be tested. Indeed, the new synthetic process delivers multi-gram quantities of this agent at a fraction of the cost of the leading competitive routes, thereby making this agent much more affordable to researchers.

In another important area of investigation, the Evans group recently completed the total synthesis of marinomycin A, which is a potent new antibiotic that is equipotent with vancomycin. "This represents an important lead for the treatment of serious bacterial infections, particularly given the growing problem with antibiotic resistance and the fact that the drug pipeline in this area is almost empty due to the lack of investment by major pharmaceutical companies," states Evans. The key to the total synthesis is the ability to construct the complex macrodiolide using salicylates as molecular switches to suppress polymerization. Salicylates are prevalent in many biologically active agents, including aspirin, however, the ability for the salicylate to modulate the reactivity of the ester using hydrogen bonding to attenuate its reactivity, had not been described prior to his group's ground breaking work. Evans believes that "this could impact medicinal chemistry since the salicylate provide an amide surrogate," which is presumably why this motif has been incorporated into literally hundreds of naturally occurring bioactive agents.

Professor Evans was born in Llangollen, Wales in 1964. He gained a B.Sc. with first class honors in Applied Chemistry at Newcastle Polytechnic in 1987 and a PhD in Organic Chemistry at the University of Cambridge in 1991 under the supervision of Professor Andrew B. Holmes, FRS. He then did postdoctoral studies with Professor Philip D. Magnus, FRS at the University of Texas at Austin as a NATO Postdoctoral Fellow. In 1993, he joined the faculty at the University of Delaware as an Assistant Professor and was rapidly promoted through the ranks to Professor. In 2001, he moved to Indiana University followed by the University of Liverpool in 2006, where he was the Heath Harrison Chair of Organic Chemistry. In 2012, he moved to his current position as the Alfred R. Bader Chair in Organic Chemistry at Queens University in Kingston, Ontario. He has been recognized with numerous honors and awards, including most recently, the Pedler Award from the Royal Society of Chemistry and election as a Fellow of the American Chemical Society.

2012-2013 DEPARTMENTAL HIGHLIGHTS

June 2012

Cathy Crudden has taken over as President of the Canadian Society of Chemistry.

The new enzyme reaction discovered by Fern McSorley (Zechel group) is featured in JACS Spotlights in the article "Getting phosphate from phosphonate."

Sean Mercer(Jessop group) awarded the ACS Kenneth G. Hancock Memorial Award.

Thomas Kraft(Nunzi group) is awarded a scholarship by the Embassy of France in Ottawa for his research on Carbon Nanotube Solar Cells.

July 2012

Natalie Cann has been appointed Head of the Department of Chemistry for the period July 1, 2012 to June 30, 2018.

Andrew Evans has accepted an appointment in the Department of Chemistry as Alfred R. Bader Chair in Organic Chemistry.

Hugh Horton is promoted to rank of Professor.

August 2012

The President of Poland conferred the Order of Polonia Restituta on Gregory Jerkiewicz.

September 2012

Simon Hesp and Gus Shurvell receive MAIREPAV7 Best Paper Award for their contribution "Waste engine Oil Residues in Asphalt Cement".

October 2012

Bob Lemieux is the recipient of the Samsung Mid-Career Award from the International Liquid Crystal Society.

November 2012

Andy Evans has been awarded at Tier 1 Canada Research Chair in Organic and Organometallic Chemistry and a CFI Leaders Opportunity Fund on "New Metal-Catalyzed Allylic Substitution and Higher-Order Carbocyclization Reactions"

Ashley McMath and Julia van Drunen (Jerkiewicz group) win the Best Poster Award at the International Symposium on Electrocatalysis.

Cathy Crudden is chosen as a PI for a new World Premier Institute that is funded by one of Japan's largest funding agencies (JSPS).

December 2012

Robert Lemieux has been appointed Associate Dean of the Faculty of Arts and Science for the period January 1, 2013 to June 30, 2015.

Switchable salts developed by Sean Mercer (Jessop group) combined with suggestions from Stephen Brown have led to a technology that has been made into a spinoff company by GreenCentre Canada.

Peter Loock's photonic guitar is highlighted in the show "Guitar Picks" on the HiFi HD channel.

Philip Jessop is the recipient of the Technology With the Potential For the Most Profound Impact Award through Parteq.

Sean Mercer (Jessop group) receives the ACS Kenneth G. Hancock Memorial Award.

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Message from the Head

NATALIE CANN

Greetings Chemistry Alumni!

The past year has been event-filled and I have the daunting task of highlighting recent news and events in the Department. The sidebars here and on page 5, provide a detailed news listing but, without a doubt, the highlight of the year was the August arrival of Prof. Andrew Evans. Dr. Evans is the new Bader Chair in Organic Chemistry and a Tier 1 Canada Research Chair in Organic and Organometallic Chemistry. His arrival has energized our synthetic organic chemistry group and provided several new collaborative opportunities with members of the Department and with the greater Queen's community.

This year, 29 students graduated with chemistry B.Sc. degrees and 18 students graduated with degrees in engineering chemistry. The Departmental Medal recipient, given to the graduating student with the highest GPA, went to Michelle Todd and this year's Society of Chemical Industry Merit Award was awarded to Nolan Horner. Thirteen doctoral students and ten Master's student also graduated this year. Our graduate students' many recent successes are highlighted on the side bar here and on page 5.

The fourth year research projects are a culminating experience for our undergraduate students. On April 18th, forty-nine students in Engineering Chemistry (Applied Science) and Honors Chemistry (Arts and Science) presented the results of their research during a day-long mini-symposium. The Smith Prize and Sullivan Prize competitions recognize excellence in undergraduate research and, this year, the nominees' research presentations were judged by Innovation Council Members Steve Leach (Ridout &Maybee LLB) and Ken Stevens (DuPont Canada). Four students were recognized for their outstanding work: Chien-Hsun Lee (sup. Snieckus), Verena Goldbach (sup. Wang), Ramona Neferu (sup. Amsden) and Jeffrey MacSween (sup. vanLoon).

First year Arts and Science chemistry will be changing in 2013. The course enrolment has been high and, this year, over 1000 students were registered. Changing such a large course is challenging but Drs. Hugh Horton, David Zechel, Nick Mosey, and Michael Mombourquette have been hard at work developing a blended first year course, with support from the Faculty of Arts & Science. The new course combines lectures, weekly tutorials, weekly labs, assigned readings, online resources, and online homework in a structured learning plan. Students will benefit from more frequent tutorials and labs, and a professionally designed Moodle site that guides them through the course.

A new graduate course is under development: CHEM 834 focuses on business skills that are relevant for chemists working in industry. The Innovation Council is actively involved in all aspects of the course which will be included in the professional skills development unit of the CREATE Chiral Materials: An International Research & Education Program (www.chem.queensu.ca/create) in chemistry, physics, and chemical engineering.

In addition to the arrival of Dr. Evans, a number of other personnel changes are under way. Dr. Stan Brown will be retiring in August but he plans to continue his active research program on the destruction of organophosphate pesticides and chemical weapons. Stan served as head of department from 1995 to 2002 period in which the department moved to Chernoff Hall and many new chemistry faculty were recruited to Queen's. Dr. Ruiyao Wang, our X-ray crystallographer for the past 12 years, has taken a faculty position. His dedication and expertise will be missed by all. We are currently interviewing a number of outstanding candidates and hope to welcome a new X-ray Instrumentation Manager to the Department soon. We are also currently advertising a Lab Coordinator position in preparation for the retirement of Dr. Henryka Tilk next summer. For many years now, Dr. Tilk has ensured that our undergraduate students develop outstanding lab skills and a solid knowledge of organic chemistry. Henryka will be bringing our new lab coordinator up to speed over the next year.

Our LinkedIn community is growing and growing. Keep up to date, and share your news, by joining the Queen's University Chemistry group on LinkedIn at **http:// www.linkedin.com/ search/ fpsearch?type=people&keywords=queens+university+ chemistry&pplSearchOrigin=GLHD&pageKey=member-home**

Institute of Transformative Bio-Molecules: Connecting molecules, creating value, and changing the world

Prof. Cathleen Crudden is one of only three international scientists chosen to be part of the Institute of Transformative Bio-Molecules, located in Nagoya Japan and funded by the Japanese Government and Nagoya University to the tune of $175 Million CDN. This institute is one of only a handful of World Premier Institutes of the Japan Society for Promotion of Science (JSPS). The ultimate goal is for these institutes to be similar to the Max Planck institutes in Germany, and at the same time as world–class research is carried out, to internationalize Japanese science and education.

The first step in designing the institute was formulating a goal, and this was not difficult for Centre Director Kenichiro Itami, who is one of Japan's premier synthetic chemists and, at 42, one of the youngest directors of a World Premier Research Institute. Dr. Itami was well aware of the advances that have resulted from the interactions between chemists and biologists addressing human health issues, and aware that similar interactions were not happening with plant and animal biologists.

Most approaches to design drought resistant plants, or biofuels that do not take up otherwise arable land, involve genetic manipulation, but this approach is not always successful. In addition to meeting with considerable consumer apprehension, there are scientific reasons why genetic manipulation doesn't always work. In many species, for example, the deletion of genes that would lead to a desired change in function (for example increased drought tolerance) simply leads to the death of the species. In other cases, the gene can be redundant, so when one gene is "knocked out" there are others to take over, such that there is no net observable effect. Thus Director Itami will bring chemists and biologists together to develop a chemical approach to problems in plant and animal biology.

The Crudden group has started work with animal biologist Takashi Yoshimura to look at chemical approaches to controlling seasonal breeding in birds and animals. Their work involves the synthesis of synthetic thyroid hormones, which may also have eventual applications in humans. This work takes advantage of the unique synthetic skills that the Crudden group has developed over the past few years for the synthesis of molecules that closely resemble key thyroid hormones. Other work on the horizon for the Crudden group includes developing *in vivo* catalysis, with key reactions carried out in the body.

Prof. Crudden has hired three postdoctoral fellows and an assistant professor, paid for by the institute, and will travel 3-4 times per year to work in Japan. Although the research work on this project will be centred in Japan, Crudden's students will have the opportunity to travel to Japan as part of the program, and similar exchanges are planned with students from Japan. Akiko Yagi from the Itami group is currently carrying out research here at Queen's, and undergraduate student Joel Smith will be going to Japan for three months later next year. We hope these exchanges will enrich the student experiences and learning for both groups of students. No doubt, there will be updates for this Institute in the future.

Message from the Department Manager

JOHANN JARDINE

Renovations continue to move forward in Chernoff Hall. The department worked closely with Dr. Evans, the Bader Chair, to ensure that his labs were customized to meet his needs. I am especially grateful for all of the assistance I received from Jamie Thompson in the PPS department for his continued support in all areas of the renovations for Dr. Evans. Dr. Jean-Michel Nunzi's lab received alterations this year to improve accessibility from the 3rd floor corridor. The undergrad labs on the 2nd floor added an additional Snorkel in Room 210A. The new snorkel provides one additional work space area to accommodate requirements for CHEM/ENCH 212.

The department had a few staffing changes this year. The department's undergraduate assistant Meredith Richards welcomed a new daughter, Elyse Mary, to her family. During Meredith's maternity leave our receptionist Michelle Boutilier assumed the Undergraduate Assistant duties. The receptionist position was filled by Kim Jesse on a one year term. Dr. Ruiyao Wang , X-Ray Instrumentation Manager resigned from his position in February to follow his dream to be an Associate Professor in the Chemistry Department in Xi'an Jiaotong-Liverpool University in Suzhou, China. An extensive review process of qualified applicants for the X-Ray instrumentation position is underway.

In February of this year the University expanded wireless connectivity in Chernoff. This University wide initiative has greatly improved our ability to access the internet from almost every area of Chernoff Hall. The department has transitioned to Moodle an open-source, password-protected learning management system. Moodle will be used in the department for academic course administration and grade management. Moodle can also be used to deliver academic courses on the Web or to supplement face-to-face instruction. In preparation for the fall term, the department's undergraduate assistant has been very involved in building templates and working with faculty members as the department transitions to this management tool.

Improved Sustainability for Canada's Road Infrastructure

After nearly 22 years of hard work, several million dollars of research funding, a few million in-kind for the construction of 33 trial sections, numerous field trips, reports, papers and presentations, efforts by the Hesp Research Group and their collaborators at the Ontario Ministry of Transportation are starting to pay off.

Since 2012, the Ministry has implemented the double-edge-notched tension test (MTO LS-299) for the acceptance of all modified asphalts. Associated acceptance criteria for LS-299 should guarantee that the asphalts used possess sufficient strain tolerance to prevent premature wheel path cracking. The extended bending beam rheometer test (MTO LS-308), which considers the gradual hardening when asphalt is cooled for days at cold temperatures and thus limits transverse cracking, remains included for reporting only. Asphalt cement suppliers continue to express concerns limiting the full implementation of both LS-299 and LS-308. Both methods make it more difficult to use certain diluents, modifiers, and modification processes.

In 2009, Dr. Hesp and collaborators discovered that most asphalt cement sold in Ontario is modified by the addition of waste engine oil, at levels ranging from 5 to as high as 20 percent. Largely paraffinic waste engine oil residue induces a slow precipitation of the polar aromatic and asphaltene fractions, stiffening the material over a period of days and weeks, and invariably causing premature and excessive cold temperature cracking during late winter and early spring.

Since 2009, Kingston has implemented both LS-299 and LS-308 and associated criteria for the asphalt in a number of paving contracts. In addition, the City has banned the use of waste engine oil residue in all future construction. New driving surfaces on Battersea Road, Centennial Drive, Division Street, John Counter Street, King Street, Midland Avenue, Princess Street, and other areas will benefit from superior quality materials. The asphalt cements used for the 2012 reconstruction of John Counter and the Centennial Drive extension defied aging in the lab and should therefore provide a crack-free driving surface for many years to come. For the 2013 season, Kingston has specified the same quality on an additional 15,000 tons of hot mix asphalt!

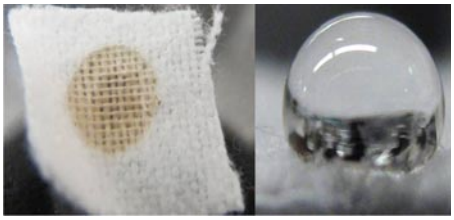
Professor Hesp inspecting a road that is showing extensive cracking after only 6 years of service.

Block-Copolymer-Based Designer Architectural Materials for Clean Surfaces

Many modern applications require tailor-designed materials based on particles with well-designed architectures and surface functionalities. The toner (pigment) particles used in photocopiers represent one such example of architectural materials. To facilitate the transport and precise deposition of these particles, they need to possess an optimal size and shape, and have a surface charge. During the image formation, these toner particles are fused onto paper by a heated roller. To minimize damage to the roller, the particles should be as spherical as possible. Therefore, raspberry-like charged particles are used for this application.

In the past 21 years, Guojun Liu's group has developed general methodologies for preparing architectural materials from block copolymers. Block copolymers are prepared by polymerizing different individual molecular precursors known as monomers in sequence to yield covalently-linked polymer blocks. The simplest block copolymer incorporates two different blocks and is thus known as a diblock copolymer. Block copolymers have been popular because they have the notable ability to assemble spontaneously or self-assemble, under various conditions, into regularly-shaped nanostructures. For example, if an …AAAAABBBBB… copolymer is dispersed into a selective solvent for the A block, it can self-assemble into nanometer-sized spherical micelles. In these micelles, the insoluble B block of different polymer chains aggregate together to form the spherical core while the soluble A block stretches out into the solvent phase.

The Liu group works at developing new methods for preparing these unique architectures. Interestingly, they have used their knowledge and expertise to fabricate architectural coatings that strongly repel water and oil. When these coatings are applied to cotton, the cloth is impermeable to concentrated sulfuric acid, alkaline solutions, and many lab reagents. A coated lab coat would provide enhanced protection against chemical spills and improve lab safety. Coated textiles could also be used as table cloths and napkins, since they also repel wine, coffee, and ketchup. The coatings can also be applied onto glass, metal, wood, concrete, and other substrates. The prospect of durable clean surfaces, fingerprint-resistant iPad screens, and anti-graffiti coatings has motivated an Ontario-based company to license this technology. The Liu team and their commercial partner are working ardently to realize these applications.



Concentrated H_2SO_4 droplet tests on uncoated (left) and coated (right) cotton. A burn mark is left behind on the untreated cotton. The photo on the right was taken 30 min after the droplet was applied onto coated cotton. The fabric is undamaged and the droplet exhibits minimal contact with the coating.

A spotlight on Professor Stan Brown **by David Zechel**

Professor R. Stanley (Stan) Brown will be retiring this summer. He will, however, maintain an active research program for the near future, which reinforces the maxim that physical organic chemists never truly stop thinking about chemistry, they simply reach equilibrium. Stan was born in High River, Alberta, and attended the University of Alberta for his B.Sc. (1964-1968). Stan was also an elite, medal-winning athlete on the varsity swim team. Despite Stan's speed in the water, fate would show that his catalysts perform much faster in non-aqueous solvents. Following undergraduate studies, Stan headed south to UC San Diego where he obtained his M.Sc. and Ph.D. in chemistry (1968-1972) with the late Teddy G. Traylor, a pioneer in organometallic and bioorganic chemistry. It was here that Stan's fascination with reaction mechanisms took root as he made seminal discoveries in the 'vertical' stabilization of cations by σ-bonds. Stan then moved on to the great Ronald Breslow's lab at Columbia University for postdoctoral studies (1972-74) where he studied enzyme mimetic reactions.

In 1974 Stan returned to U of A to begin his independent research career where he rose to the position of full Professor in 1984. Over 21 years at U of A the Brown lab flourished, with major discoveries in photoelectron spectroscopy of bonding, substituent effects on ionization potentials, the hydrolysis of amides, acyl and phosphoryl transfer reactions, and enzyme model systems involving metal ions. His research also addressed the formation of the bromonium ion, and in 1994 his lab obtained the X-ray crystal structure of a stable version of this iconic intermediate. This track record is all the more awe inspiring when you learn that Stan was an Associate Dean of Graduate Studies (1993-1994). In 1995 Stan was ready for a new challenge and moved to Queen's to become Head of the Chemistry Department (1995-2001). When Stan arrived at the old Chemistry building, then sprawled throughout Gordon Hall, Gordon Annex, and Frost, the ventilation was so poor that the soles peeled away from his beloved cowboy boots. Folklore suggests that this event triggered his campaign for a new Chemistry building, which ultimately led to the construction of our current home, Chernoff Hall. During his time as Head, Stan further shaped the future of our department by orchestrating the hiring of Gang Wu, Hugh Horton, Hans-Peter Loock, Richard Oleschuk, Stephen Brown, Suning Wang, and our current Head, Natalie Cann. While initially hard on footwear, the move to Queen's did not slow down research in the Brown lab. At Queen's, Stan and his students, along with the steady hand of his longtime research assistant Dr. Alexei Neverov, developed a series of enzyme inspired, metal ion based catalysts that accelerated the solvolysis of esters, amides, and phosphate esters. The key to the power of these catalysts was the use of a solvent medium that had a lower dielectric constant than water, which turned out to be an elegant way to approximate the active site environment of an enzyme. This discovery had immediate applications for the destruction of chemical warfare agents like VX and Soman, which quickly garnered the attention of the United States Army, and led to several patents.

Over his research career, Stan has authored over 180 publications, 10 book chapters, and delivered more than 110 invited seminars. Stan has also long been known as a dedicated teacher. His formidable physical organic chemistry courses have, over the years, simultaneously managed to challenge yet expand the mechanistic understanding of generations of students. Remarkably, in addition to these achievements in research and teaching, Stan also found time to contribute to the greater scientific community by serving in several roles within the Canadian Society for Chemistry, including Vice-President and President. He has also reviewed the chemistry graduate programs of several universities, the highly successful Canada Research Chairs program, served on the editorial board of several journals, as well as a number of NSERC grant committees. This tremendous record has won Stan many awards over the years, including two prestigious Killam awards, the Syntex Award, the Alfred Bader Award, the Queen's Chemistry 'Prof of the Year', the Queen's University Prize, the R.U. Lemieux Award, the Montreal Medal, and the Catalysis Award (CIC). Stan is also a fellow of the Chemical Institute of Canada, the Royal Society of Canada, and the International Union of Pure and Applied Chemistry. With 'only' his research program to attend to in his retirement, Stan plans to spend more time on his extracurricular passions amongst the rocky wilderness north of Kingston where he and his wife Donna are building a new cottage. The cottage faces a beautiful lake, so once again Stan is confronted by water!

2012-2013 DEPARTMENTAL HIGHLIGHTS

January 2013

Rebecca Holmberg's (Jerkiewicz group) research is featured on the cover of the December 2012 issue of ACS Applied Materials and Interfaces.

Zachary Hudson (Suning Wang group) has been named the CSC 2013 CCUCC Chemistry Doctoral Award winner.

Victor Snieckus was honoured in a symposium hosted by Tallinn University of Technology.

February 2013

Industry is very interested in a new technology developed by Guojun Liu and Dean Xiong (Liu group) that has shown promise in repelling undesired water and oil-based deposits on many surfaces.

March 2013

Victor Snieckus receives the 2012 Global Lithuanian Award from the President of the Republic of Lithuania.

April 2013

The Undergraduate DSC banquet is March 22, Richard Oleschuk receives the Faculty of the Year award, Andy Fraser (Macartney group) receives the TA of the Year award, and Michelle Boutilier receives the Staff of the Year award.

Suning Wang's research has discovered a simple, cost-effective method for making new molecule materials which are similar to graphene and have additional properties.

Yaoting Zhang (Mosey group) is featured on the School of Graduate Studies website for his research.

The following students win national NSERC awards for 2013-2014: Ningsi Mei (CGSM Oleschuk group), Jesse Vanderveen (CGSM Jessop Group), Mark Raycroft (PGSD3 Stan Brown group), John Saunders (CGSD2 Loock group).

Ontario Graduate Scholarship recipients for 2013-2014 are: Tamara DeWinter(Jessop group), Thomas Kraft (Nunzi group), Michael MacLean(Crudden group), Lisa Saunders (Crudden group), Matthew Thompson(Lemieux group).

May 2013

The department held a careers workshop on May 10th for Graduate students, Post Doctoral Fellows and summer Undergraduate students. Presentations were done by Queen's Career Services and Wayne Schnarr, Chair of QCIC.

Science Rendezvous 2013 was held at the K-Rock Centre May 18th with 2500 members of the public attending. Chemistry tables and Magic Show were presented by Prashant Agrawal, Nicholas Andrews, Marie Barnes, Kyle Boniface, Tamara deWinter, Katie Groom, Michael Jessop, David Jessop, Lili Mats, Ashley McMath, Brandon Moore, Nausheen Sadiq, John Saunders, Christine Smith, Samantha Voth, and Philip Jessop.

In a partnership with CNRS Institut des Matériaux Microélectronique et Nanosciences de Provence at University Aix-Marseille / Toulon, Jean-Michel Nunzi has been awarded a two-year grant from the France-Canada Research Fund for the development of a new generation of self-assembled high efficiency plasmonic solar cells using a bottom-up molecular engineering approach.

Zachary Hudson(Wang group) receives the 2013 Governor General's Academic Gold Medal from the Fellowship Committee of Queen's School of Graduate Studies.

Peter Loock provides tour of Chernoff Hall to German Ambassador, Werner Wnendt.

Philip Jessop is the recipient of the 2013 Eni Award for New Frontiers of Hydrocarbons.

Zac Hudson, Governor General's Gold Medal Recipient

Congratulations to Dr. Zachary Hudson! Zac is one of two recipients of this year's Governor General's Academic Gold Medal, awarded for the most outstanding graduate thesis in any field. He is also this year's winner of the Canadian Council of University Chemistry Chairs (CCUCC) Doctoral Award, given for the best chemistry Ph.D. thesis in Canada.

Zac began his B.Sc. at Queen's in 2004 as a Chancellor's Scholar, taking home more than 25 scholarships and awards in mathematics, biology, economics and chemistry over the course of his degree. During his undergraduate studies he undertook several research projects in Chemistry, studying the self-assembly of liquid crystals with Prof. Robert Lemieux, the velocity map imaging of nitrites with Prof. Hans-Peter Loock, and luminescent boron compounds with Prof. Suning Wang. He completed his Chemistry BSc in 2008, taking home the Governor General's Silver Medal as the top undergraduate student at Queen's.

For his doctoral work, Zac joined the research group of Dr. Suning Wang as an NSERC Canada Graduate Scholar, focusing on the design and synthesis of new luminescent boron compounds. His work examined the use of these materials in organic electronics, with applications as chemical sensors, photochromic dyes, and as components in solid-state lighting. He has since published 24 papers and submitted 3 patents in inorganic and materials chemistry, and to date his work has been cited nearly 500 times. In addition, Zac also held graduate fellowships internationally, studying at Jilin University in China with Prof. Yue Wang and at Nagoya University in Japan with Prof. Shigehiro Yamaguchi. He was well-known at Queen's as an outstanding teacher, having been voted the best teaching assistant in chemistry and applied science by undergraduate students on several occasions. He is currently an EU Marie Curie postdoctoral fellow with Prof. Ian Manners at the University of Bristol in the UK, where he is studying the self-assembly of block copolymer nanostructures.

New Initiatives by QCIC

The Queen's Chemistry Innovation Council (QCIC) has been active for over ten years as an advisory body to the Chemistry Department. All Council members have a strong interest in Queen's Chemistry and use their extensive experience in chemistry-related industries and government agencies to provide a unique perspective on addressing the challenges faced by the department. In the past Council members have been active in raising funds and participating in the creation of new courses and internships.

When QCIC held its Annual Meeting in October 2012, there were two innovative changes. Preceding the Welcoming Dinner and the presentation by George Scott from Scott Environmental, several QCIC members met with undergraduates, grad students and post-docs to discuss career paths, current market needs and industry trends. This is an event which will be continued on an annual basis, supplemented by individual members making presentations when they visit Kingston. In this difficult economy, mentoring and networking is essential to the long term success of Queen's Chemistry.

Prior to the meeting, two questions were posed to groups including faculty and students: what challenges does Queen's Chemistry face and how can QCIC help? After hearing the presentations, QCIC agreed to review and move forward on a series of initiatives. One of the initiatives was the student mentoring mentioned above. A second active initiative was the creation of a Queen's Chemistry Management Course to teach students basic management and business skills. QCIC member Dr. Will Rogers worked closely with the Department to generate a course outline, for which the detailed course materials are now being created. This will be a credit course which will rely upon QCIC members and other Chemistry graduates as the volunteer lecturers.

[http://www.chem.queensu.ca/chemistryN/About/qcic/index.asp for more information on QCIC]

New QCIC Members

Eleanor Barker
Toll Cross Securities

David Dolphin
Endetec

Allan Rey
Apotex Pharmachem Inc.

George Scott
Scott Environmental

Ken Stevens
DuPont Canada

Cynthia Fekken
Queen's University

Homecoming 2013

Please join us on

Saturday, October 4
or
Saturday, October 19

for a BBQ and a tour of the department.

Meet Two Students Supported by Queen's Chemistry Alumni and Friends

Tamara DeWinter, recipient of the McAdie Chemistry Doctoral Student Award

Tamara grew up in Sussex, New Brunswick, and obtained her Chemistry B.Sc. at the University of New Brunswick. As an undergraduate, she researched hydrogen storage materials, under the supervision of Prof. Sean McGrady. She also worked for HSM Systems Inc. where she contributed to the building of a solar and wind powered Green Energy trailer, designed for transport to natural disaster areas.

Her current research, under the supervision of Dr. Philip Jessop, focuses on the asymmetric hydrogenation of prochiral unsaturated molecules such as olefins, ketone, imines, etc. She is working towards two goals in her research: the first is to hydrogenate olefins bearing ligating functional to determine the effects of the nature and orientation of the ligating group's coordinating ability, and the proximity of the functional group to the site of unsaturation. The second goal is to develop strategies for increasing enantioselectivity in prochiral substrates bearing only weakly-coordinating or non-coordinating functional groups such as amines. The goal is not only to understand the chemistry but also to create new and potentially less expensive routes to difficult chiral pharmaceuticals.

During her time at Queen's University, Tamara has been involved with many extra-curricular activities: Science Rendezvous, Run for the Cure, and she is the current President of the Queen's Graduate Chemistry Society. In addition to the McAdie award, Tamara has received a Walter C. Sumner Fellowship and, recently, an Ontario Graduate Scholarship.

Lacey Reid, recipient of The 1960's Chemistry Scholarship

Lacey obtained her B.Sc. degree from Acadia University in 2010, and was awarded an Alexander Graham Bell Canada Graduate Scholarship (NSERC) to pursue studies at the master's level. She started her M.Sc. work under Professor Cathleen Crudden, working on chiral materials for heterogeneous catalysis.

With high global demand for catalysts, the development of efficient and recyclable catalysts is of growing importance. Periodic mesoporous organosilicas (PMOs) are a class of high-surface-area silica materials that have the potential to become economic competitors for zeolites and metal-organic frameworks (MOFs) in catalytic applications. Organosilicas have the advantage of a wider range of pore sizes (thus wider range of catalysis) than zeolites, and superior stability compared to MOFs. The organic groups within the porous framework can be functionalized to prepare a variety of heterogeneous catalysts, which can be easily filtered from a reaction mixture and reused several times without loss of catalytic activity. Currently, Lacey is studying the interaction of chiral dopants with organic groups within the PMO framework with the idea that chirality can be generated inside the pores of the material.

Lacey is enrolled in the NSERC CREATE Chiral Materials program. Through this program, Lacey travelled to Nagoya, Japan in September 2012 for a four-month exchange program where she worked with Dr. Inagaki at Toyota Central R&D Labs, Inc. In addition to the 60's Scholarship, Lacey has been awarded a Walter C. Sumner Memorial Fellowship.

The faculty, staff, and students in Queen's Chemistry thank our alumni and friends for their ongoing support. Your contributions help support our graduate and undergraduate students, enrich our research programs, assist in the upgrade of teaching equipment, and support our seminar series. Please visit www.chem.queensu.ca/giving to learn about current Advancement priorities and opportunities in Queen's Chemistry.

Congratulations to the Class of 2013!

Ugrad Life

The ChemDSC organizes social events and handles administrative tasks such as the teaching assessments, attending Faculty Board, and DSC Assembly meetings. This year the DSC organized a BBQ during the second week of classes, to welcome all chemistry students and researchers. *Chemistry Clothing* was sold in the fall and the annual Chemistry Banquet was held in March. Awards for the TA, Prof, and Staff of the Year were presented to **Andy Fraser, Richard Oleschuk,** and **Michelle Boutilier**, respectively. Other social events included *Nachos with Profs, Ugly Christmas Sweater Pub Crawl,* and a *Pumpkin Carving Contest* and two information sessions for undergrads: a "Working in the Department" seminar and a "Fourth Year Honours Project" seminar.

COMPLIMENTARY ISSUE

Q-CHeM CHRONICLES

Queen's UNIVERSITY

AUGUST 2013

TA Teaching Awards

In order to promote and recognize excellence in teaching (tutorial and laboratory) by Teaching Assistants in Chemistry, the following awards are presented each year in September.

Back row Mark Raycroft, Department of Chemistry TA Award for Excellence in Teaching;Julia van Drunen, Fisher Scientific Teaching Assistant Award for Chemistry Tutorials; front row Fern McSorley, Din Lal Teaching Assistant Award; Vanessa Little, David Thomas Teaching Assistant Award for Synthetic Laboratory; Parisa Akhshi, William Patrick Doolan Prize in Chemistry; Kevin Fowler, Agilent Technologies Excellence in Teaching Assistant Award

Graduate Student Life in the Department

It has been a exciting year in the Department of Chemistry. The Graduate Society has been very busy organizing many social and educational events. Last summer, we started with several lunchtime barbecues. As the school year started in September, we held several welcome mixers for the incoming students alongside the annual Queen's Graduate Chemistry Symposium.

This year, with the Department of Chemistry and the undergraduate Departmental Student Council, we hosted a careers workshop with members of the Queen's Chemistry Innovation Council. This workshop was well attended by students and postdoctoral fellows. With the wealth of knowledge and experience from our QCIC members, this event was a great learning experience for all.

Later in the fall, we celebrated National Chemistry Week with a chemistry trivia event, a periodic table of cupcakes and a visit to Fort Fright at Fort Henry. Our annual holiday party was held at the end of November at the Grad Club. This event was very well attended with many friends from the Physics Department, who were invited for the first time this year.

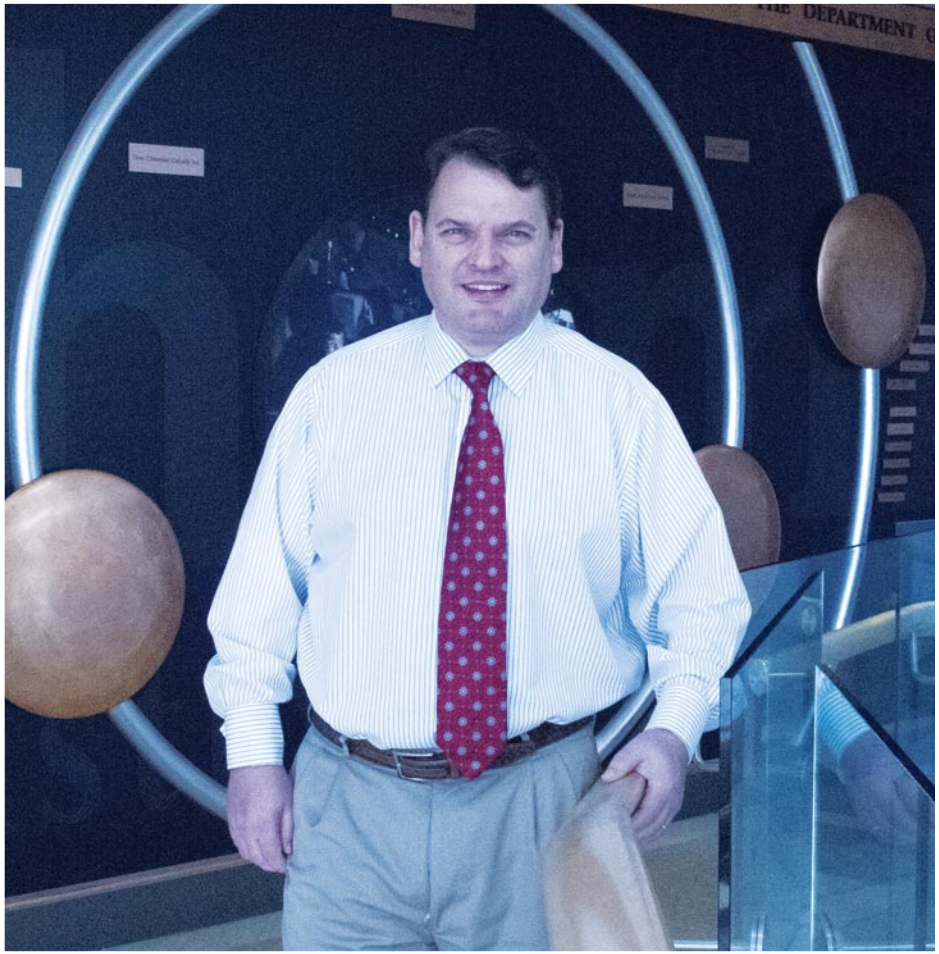
During the winter term, the QGCS attended a Kingston Frontenac's game and organized a bowling night at Cloverleaf Lanes. Then, in May, we hosted a networking workshop with Ms. Julia Blackstock from Career Services and Dr. Wayne Schnarr of the Queen's Chemistry Innovation Council. In an interactive discussion, we learned the value of networking in career development and how to effectively communicate with others.

Graduate Chemistry Society

The 2012/2013 elected executives of Queen's Graduate Chemistry Society are: John Saunders, President; Tamara de Winter, VP Internal Affairs; Michael MacLean, VP Finance; Ningsi Mei, VP External Affairs; Gillian MacKey, 3rd Floor Rep; Weijie Jiang, 4th Floor Rep; Kyle Boniface, 5th Floor Rep.

DESIGN: QUEEN'S MARKETING 13-0325

Andrew Evans
Bader Chair in Organic Chemistry



The Department welcomes Professor P. Andrew (Andy) Evans, Bader Chair in Organic Chemistry and Tier 1 Canada Research Chair in Organic and Organometallic Chemistry.