

Celebrating a Dozen Years of Chemistry in the John & Edna Davenport Chemical Research Building

Chemistry
UNIVERSITY OF TORONTO

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Celebrating a Dozen Years of Chemistry
in the John & Edna Davenport
Chemical Research Building

Message from the Chair

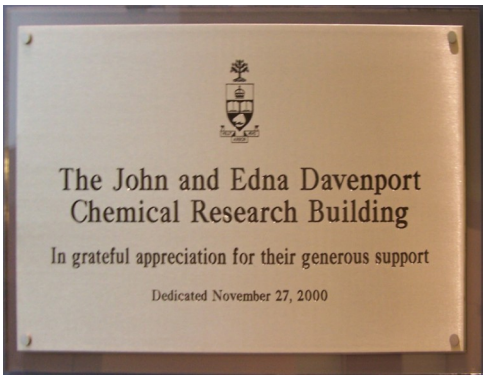
As soon as students who are thinking about graduate work visit the Davenport building, they know that this is the place to be. With superbly appointed and equipped labs, group rooms and faculty offices, seminar space and social areas it is no wonder. Thus, thanks to the gift of the Davenport Building, our Chemistry Department was able to attract highly talented students who viewed our space as being equal or better than what was available at other top departments in the world. In the past twelve years over 261 graduate students. 162 postdoctoral fellows and research associates and 177 undergraduate students have been trained in research in biological chemistry, chemical synthesis, catalysis and sustainable chemistry by the 13 faculty whose groups have resided here. As you will read in the following accounts, these people have discovered amazing new chemistry. The results have been published in over 1000 papers and these have been cited by other researchers more than 25,000 times in the period 2000 – present. All of these researchers are very thankful for the generosity shown by the Davenport family who made this possible. So are the many other Chemistry faculty members and students who benefited renovations in the Lash Miller building resulting from the matching funds raised as a result of this gift.

The construction of the Davenport building started in 1999, overseen first by Chair Martin Moskovits and then David Farrar. Mark Lautens, a member of the Committees that planned and steered the project writes:

> *"Our goal was to incorporate the best of what we already had, with state-of-the-art space that would last for many years ... We wanted students to benefit from maximum light and clear sight lines for safety so equipment rooms were placed closest to the hallways. Labs were open concept to deal with the natural growth and shrinkage of research groups as funding came and went. Fume hoods were the highest priority."*

In 2000 the Davenport Building was officially opened with great fanfare and celebration. Chair Farrar and past Chair Moskovits welcomed Peter Davenport and Linda Spire and almost their entire families as well as five Nobel Laureates,

Professor Ahmed Zewail, Professor Richard Smalley, Sir John Meurig Thomas, Professor Barry Sharpless and Professor John Polanyi. They, along with dignitaries from the University and hundreds of invited guests, crowded into a specially constructed marquee to attend the unveiling of the plaque. The Laureates' lectures about cutting edge science gave a taste of what was to come as a result of the creation of a new research building.



The new space exceeded our expectations. Established research groups moved in including those of Mark Lautens, Ian Manners, Rob Batey, Andrei Yudin, Ron Kluger, Jik Chin and Bob Morris. All of these groups immediately became more productive with expanded research operations. Chairs David Farrar and then Scott Mabury were able to recruit five stellar faculty to occupy this space: Deborah Zamble, Mark Nitz, Datong Song, Vy Dong and Doug Stephan (after Ian Manners accepted the Marie Curie Chair at the University of Bristol). Doug Stephan came as a senior Canada Research Chair from the University of Windsor having just discovered a powerful new type of chemical reaction. His research group grew from 12 to 30 people in a few years as it started to explore the many important applications of this reaction. You will read the stories of how the research of all of these groups took off like rockets thanks to the first class facilities provided here. There was not enough space to list all of the awards that have been won by the faculty and their students; these 13 faculty alone have won more than 75 major awards in this period. In fact this success has meant that we have rapidly filled the new space and are now seeking additional space to accommodate the growth – a great problem to have when some of the greatest questions of science are being tackled by our research groups.

We salute and thank the Davenports for their vision and gift that has given us so much.

Bob Morris

Robert H. Morris, FCIC, FRSC
Professor and Chair

Batey Research Group

Our group moved into the Davenport Building on its opening in 2001. We occupy two labs on the third floor. The move from the old Lash Miller labs that we occupied from 1994-2001 has played a pivotal role in our ability to tackle research problems. Our old labs provided space for just six co-workers, in a cramped and out-dated lab, with small and inefficient fume hoods. By contrast the Laboratories in the Davenport Building provide state-of-the-art research space tailored toward synthetic organic chemistry. The labs were designed with safety as a paramount concern, and as a result include excellent fume hoods for each student. In addition, the equipment rooms and group room also provide space that is attractive for students to work in. The Davenport Labs have thus had a transformative effect on our research, the lives of our students and co-workers, and our ability to recruit the best students to the department.

Research Interests

Our research is aimed at the development of new synthetic methods and strategies and their application toward the synthesis of complex natural products. Synthetic reagents are also being developed to replace the use of toxic or unstable reagents. The use of boron compounds, pericyclic reactions and catalysis (including Pd, Cu, Rh, Ru, lanthanides, and Lewis acid catalysts) are of particular importance. Emphasis is placed upon the formation of heterocyclic products and the stereocontrolled formation of C-N bonds. Synthetic targets include alkaloids as well as compounds of medicinal relevance. Ultimately, the projects being undertaken by the Batey group and their collaborators span the fields of applied chemistry, chemical biology and drug discovery.

"The labs were designed with safety as a paramount concern, and as a result include excellent fume hoods for each student."

1. Organoboron Chemistry: In the area of organoboron chemistry our group has developed the use of organotrifluoroborate salts as reagents in organic synthesis. These versatile reagents are used as synthetic equivalents to organoboronic acids, and include substituted allylic, propargylic, benzylic, fluorinated and aryltrifluoroborate salts. Addition reactions and cross-coupling reactions using a variety of catalysts have been developed to achieve selective C-C, C-O and C-N bond formations.

2. Pericyclic and Domino Reactions: We are also investigating a range of transformations for the formation of complex molecular scaffolds known as pericyclic reactions. These reactions are being used to synthesize both nitrogen and oxygen heterocycles, such as the formation of tetrahydroquinolines and pyrones by multi-component coupling reactions. One research theme that is being

explored in the context of several projects is the development of domino or cascade synthetic transformations, since these reactions can be used to rapidly increase molecular complexity. In one example we have developed a domino electrocyclic ring-opening/ring-closure reaction of functionalized furans to create highly functionalized cyclo-pentane scaffolds, that serve as precursors for the formation of marine alkaloids.

3. Chemical Biology and Target-oriented Synthesis: The synthetic methods and strategies developed by our group are being applied toward complex synthetic targets, including natural products, which display interesting biological and medicinal properties. The choice of such targets is dictated by structural interest and biological activity. Existing collaborations include projects in the cancer and antibiotic fields, and students involved in these projects have the opportunity to work on collaborative projects involving biologists in Toronto's hospitals. Many students have been fortunate to experience research in the Davenport Labs.

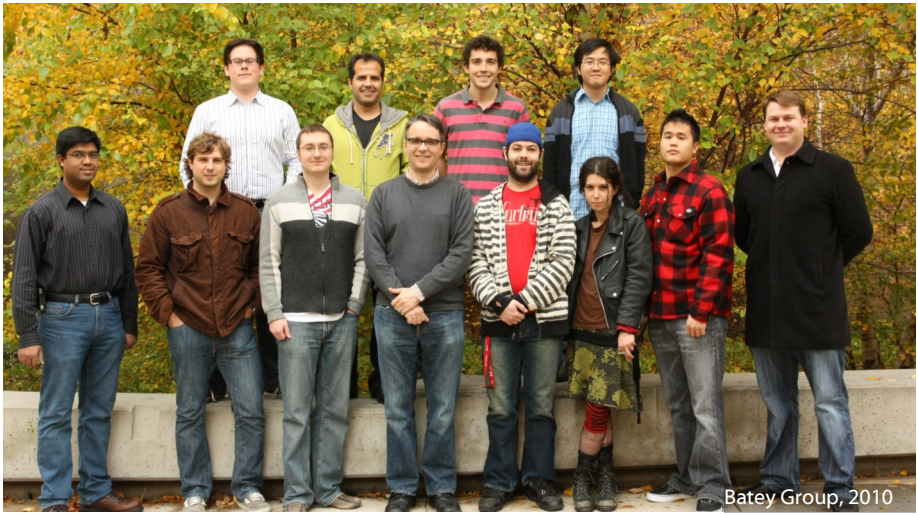
Current Students and Researchers

Graduate Students

Ramsay Beveridge
Pete Duspara
Jordan Goodreid
Simon Kim
Alan Nhieu
Timothy Ramadhar

Visiting Faculty

Mikdad Ayoub (University of Jordan)



Batey Group, 2010

Former Students and Researchers

Graduate Students	Current Position
Adam Kafal (2011, MSc)	Scientist, Toronto Research Chemicals
Farhad Nowrouzi (2011, PhD)	Toronto
Gregory Rosocha (2011, PhD)	Director, Ginarko
Andy Tjeng (2011, PhD)	Researcher, University of Toronto
Michele Cossette (2010, MSc)	Scientist, Toronto Research Chemicals
Yuri Bolshan (2009, PhD)	Postdoctoral Fellow, University of Tokyo
Christopher Smith (2009, PhD)	Postdoctoral Fellow, University of Calgary
Laurie Lynn Joyce (2009, PhD)	Patent Officer, Toronto
Julia Gavrilyuk (2007, PhD)	Postdoctoral Fellow, Scripps Research Institute
Fang Huang (2006, MSc)	Scientist, Dalton Chemicals
Ernest Lee (2006, PhD)	Scientist, Merck
Sze Wan Li (2005, PhD)	Scientist, Campbell Family Research Institute for Breast Cancer Research
Ghotas Evindar (2004, PhD)	Scientist, Praecis Pharmaceuticals
Tan Dai Quach (2004, PhD)	Scientist, NPS Pharmaceuticals
Craig Miller (2003, MSc)	Scientist, Boehringer Ingelheim
Phillip Ramsden (2003, MSc)	Scientist, Boehringer Ingelheim

Postdoctoral Fellows	Current Position
Chris Tan (2003)	Medicine Student, University of Ottawa
Heather Twin (2004)	England
Russell Viirre (2006)	Associate Professor at Ryerson University
Alexandre LeFlohic (2006)	Currently in France
Shadi Dalili (2006)	Lecturer, University of Toronto, Scarborough
Alessandro Rodrigues (2008)	Assistant Professor at Federal University of Sao Paulo (UNIFESP)
Alejandro Castro (2010)	Mexico
Tabitha Wood (2010)	Assistant Professor at the University of Winnipeg

The start of a celebration for successful PhD defences in the Batey Lab. Fourteen great PhD defences and counting!

Undergraduate Students

The undergraduate students trained in my lab since 2001 have included 2nd-4th year students, who have gone on to work in several industrial companies, or have embarked upon graduate careers in Chemistry at a number of institutions, including: the Massachusetts Institute of Technology (MIT), Harvard, Stanford, Munich, Toronto, Guelph, Waterloo, McGill, McMaster, York and Brock Universities. Other students have gone onto Medical School or Teaching College.

2011: Jazmin Bansagi (UofT), Jasmine Song (UofT), John Janetzko (UofT),

2010: Robert Chu (UofT), Charlotte Nicita (Paul Sabatier University), Alexander Stahl (UofT), Pierre Lonchambon

2009: Irena Nikolska (Volunteer student), Michael Biernat (UofT)

2008: Rivka Taylor (UofT), Yi Zhang (UofT)

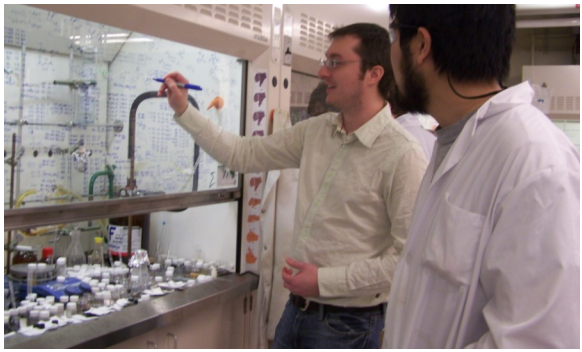
2007: Alwin Riter (University of Munich), Mike Chudzinski (UofT), Baptiste Foglieni (Paul Sabatier University), Benson Kua (UofT),

2006: Marjorie Lovera (Ecole Nationale Superieure de Chimie de Rennes), Leo Mui (UofT), Michelle Nagy (UofT), Adeline Pham (Paul Sabatier University), Michael Power (UofT), Thang Nguyen (UofT)

2005: Allegra Connor (UofT), Lynn Ikeda (UofT), Sophie Guillard (University of Montpellier)

2004: Anne Kramer (University of Munich), Jennifer Chau (UofT), Rena Greenwald (UofT),

2003: Leonid Chagal (UofT), Elliot Wakeam (UofT), Tobias Hausmann (University of Munich), Leonie Soltay (UofT)



Chin Research Group

My research group moved from McGill University to University of Toronto in 2000. At the time we were asked if we would prefer the well established labs or the new Davenport Labs. To us the new labs were a great incentive for the move. Upon arrival in the Davenport Building, we decided to completely change course and work on designing stereoselctive catalysts. The beautifully functional labs in the Davenport Building have inspired my students to develop a platform technology for making the widest variety of chiral diamines in the world. It is well recognized that chiral diamines are privileged structures for synthesizing many different stereoselective catalysts for making bioactive compounds. In addition, chiral diamines are important building blocks for making drugs like tamiflu (antiviral), eloxatin (antibiotic) and oxaliplatin (anticancer).

Research Interests

Recently, we have used our chiral diamine technology to develop efficient methods for making unnatural amino acids. It is well known that amino acids are elegant building blocks of life. They combine to form both structural and functional proteins that are essential for life. Without structural proteins we would not have muscles, hair or finger nails. Without functional proteins like enzymes that catalyze all biological reactions, we would not be able to breathe, digest food, grow, move, feel or even think. All such processes require different enzyme catalyzed reactions. Proteins are the target of many drugs for treating major illnesses including cancer, hypertension, infection and depression. Some of these important drugs like plavix, cialis and penicillins are made from natural or unnatural amino acids. In nature there are only about 20 proteogenic amino acids and they are left handed. Thus there is limited structural variety of natural amino acids. Unnatural amino acids in left and right handed forms provide unlimited structural variations. Such structural variation is needed for designing drugs that interact strongly and specifically with its target protein in three dimensional space.

"The beautifully functional labs in the Davenport Building have inspired my students to develop a platform technology for making the widest variety of chiral diamines in the world."

There is much current interest in developing unnatural amino acid based peptides as future drugs. Development of such drugs would also require efficient production of unnatural amino acids. Our chiral diamine technology is useful not only for making unnatural amino acids and their peptides but also for making other bioactive compounds.

Current Students and Researchers

Postdoctoral Fellows
Soon Mog So


Chin Group, 2010

Former Students and Researchers

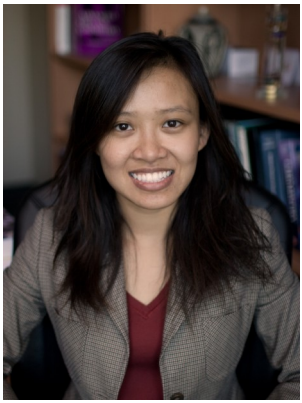
Undergraduate Students
2011: Pavel Printsev (UofT)
2010: Ali Rizvi (UofT)
2006: Yen Nguyen (UofT)

Visiting Professors
2009: Quanyi Zhao (Chinese Academy of Sciences)

Graduate Students	Current Position
Ewa Golas (2010, MSc)	Research & Teaching, University of Gdansk
Leo Mui (2010, MSc)	Director of Lunanos Inc.
Hyunwoo Kim (2008, PhD)	Postdoctoral Fellow, Columbia University
Pai Hui Yen (2008, MSc)	Tutor
Yen Nguyen (2008, MSc)	PhD student, Queen's University
Leonid Chagal (2007, MSc)	Scientist, Dalton Chemical Laboratories
Francis B. Panosyan (2005, PhD)	Medical Student, Queen's University
Nirusha Kandeephan (2004, PhD)	Sessional Lecturer, UofT & UOIT
Alicja Koprianiuk (2002, MSc)	Math Teacher, Senator O'Connor College

Postdoctoral Fellows	Current Position
Seok Jong Lee	Scientist, Samsung
Elisangela Vinhato (2008)	Scientist, Brazil
Fabrizio Mancin (2003)	Researcher, Università di Padova
Gamil Alhakimi	Founder, GL Chemtech

Dong Research Group



Over the last five years, the space we occupy in the Davenport Building has become a second home to my students and me. I chose to start my independent academic career at the University of Toronto. Among many factors, the well-designed, attractive, and modern laboratories in Davenport played a key role in this decision. Thanks to this infrastructure, my young research group has had a rapid launch. Starting with a relatively empty lab, our space is now occupied by twelve enthusiastic researchers (from across Canada and the world) and fully equipped with state-of-the-art technology (including high-pressure reactors and automated robots). During this progression, we were able to transform our scientific dreams into practical results. My team has published twenty five manuscripts in top journals, and our work has garnered scientific attention, including both national and international awards. Davenport has provided an amazing research environment for us to learn, collaborate, discover, and celebrate.

Research Interests

Organic molecules make up nearly everything around us, including our medicines, clothing, and fuels. Research in organic chemistry is thus an essential pursuit that can impact many other scientific disciplines. By finding novel methods of building molecular architecture, we can facilitate the discovery of life-saving therapeutics, invention of novel materials, and search for alternative energies.

"With this new space and state-of-the-art technology we were able to transform our scientific dreams into practical results."

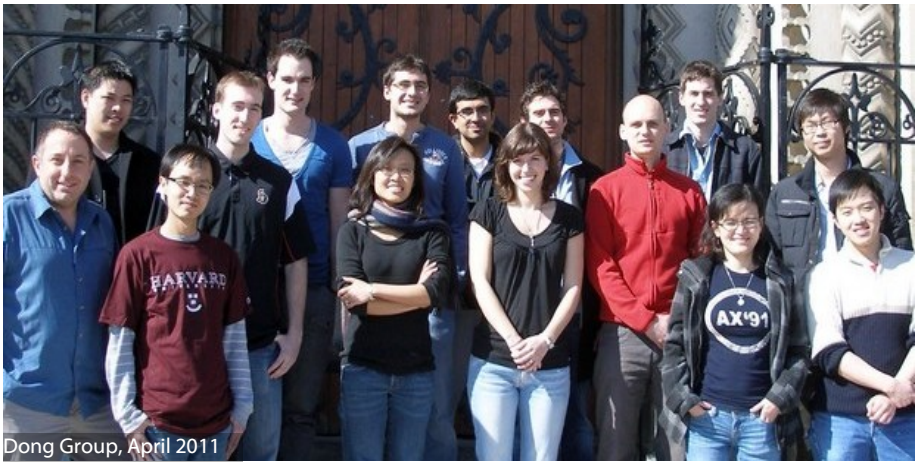
Our research mission is to invent better tools for organic synthesis, including new reagents, catalysts, and strategies. More specific goals include finding ways to directly convert carbon-hydrogen bonds into other functional groups, use carbon dioxide as a raw material, and make biologically active heterocycles. Our approach to these diverse challenges shares a common theme -to harness the power of transition metal catalysis and transform simple reagents into valuable products. Our work is motivated by 1) a fundamental interest in new organometallic pathways and 2) a practical need for more efficient and environmentally friendly technologies. We plan to use these methods to make natural products, pharmaceutical agents, and unique materials.

Current Students and Researchers

Doctoral Students
Peter Dornan
John Su
Hasan Khan
Byoungmoo Kim
Kevin Kou
Christine Le
Lauren Longobardi
Stephen Murphy
David Petrone
Diem Thi Phan

Postdoctoral Fellows
I-Hon Chen
Max von Delius

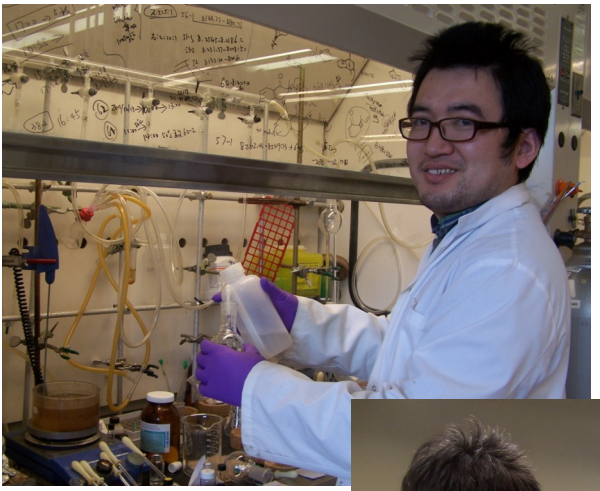

Dong Group, June 2011, Time Square, New York City

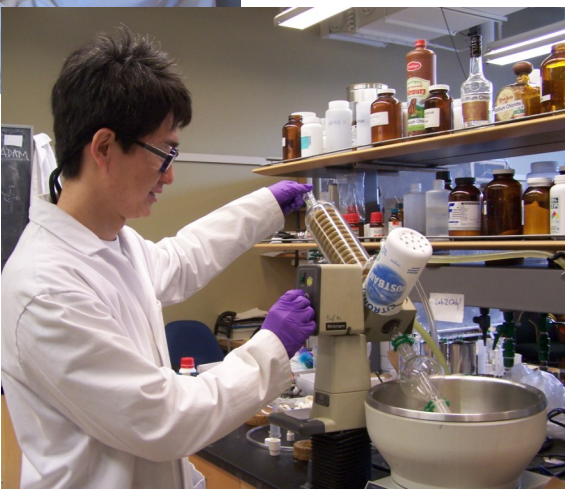


Dong Group, April 2011

Former Students and Researchers

Graduate Students	Current Position
Joseph Pignatelli (2011, MSc)	Woodbridge
Priscilla Leung (2011, MSc)	Toronto Research Chemicals
Elena Dimitrijevic (2009, MSc)	Graduate student, University of Toronto
Marija Antonic (2009, MSc)	Unknown
Marc Tremblay (2008, MSc)	CEGEP Teacher, College Montmorency
Charles Yeung(2011, PhD)	Postdoctoral fellow, Harvard University
Matthew Coulter (2011, PhD)	Consultant, Toronto
Tom Hsieh (2011, PhD)	Postdoctoral Fellow, University of British Columbia





Postdoctoral Fellows

Zengming Shen (2008)	Professor, Shanghai Jiaotong University
Yang Li (2009)	Postdoctoral Fellow, Massachusetts Institute of Technology (MIT)
Priscilla Leung (2010)	Research Associate, Toronto Research Centre
Xiaodan Zhao (2010)	Postdoctoral Fellow, Colorado State University

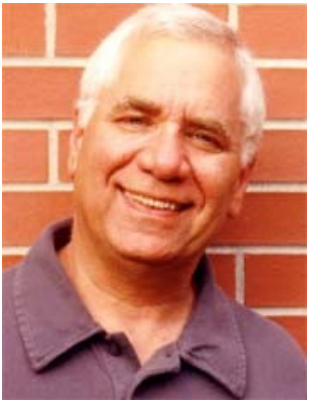
Undergraduate Students

2010: Sylvia Maule (U of T)
2009: Jane Ni (Graduate student, California Institute of Technology
2008: Angelica Rojas (U of T)
2007: Peter Ng (Graduate student, University of Ottawa)

Dong Group, June 2008

Dong Group, October 2007

Kluger Research Group



My students and I have been occupants of a portion of the fourth floor of the building since it opened. We are in the set of laboratories that were specifically adapted to support research in areas that include facilities for biologically oriented research. The advent of the building allowed us for the first time to consider what it would take to develop space that would encourage excellence in research at the interface of biological chemistry with the traditional areas of organic and inorganic chemistry. Working with the architects and engineers responsible for the design, we sought to make the labs safe and comfortable for students, foster collegiality, and permit research to occur with maximum support from the facility itself. These aspects have been remarkably successful in the actuality of the labs, shared facilities, and meeting spaces.

Research Interests

We chose our research to be in areas where the interaction of chemistry and biology can have a special impact and significance.

1. Biochemical Formation of Carbon Dioxide: We are interested in the precise mechanism that explains quantitatively how enzymes utilize vitamin B1 (thiamin) to release carbon dioxide from organic molecules that are inherently un-reactive. This interest led us to the measurements we were interested in. However, we were surprised to find that there is much more to the story – that enzymes have developed ways to control and accelerate reactions that generate CO_2 by routes that had never been seen before, despite the assumption that we knew everything. Jane Hu, a graduate student, discovered important parts of this puzzle and went on to lead a research group at Roche after her graduation. Her discoveries were at once a humbling and exciting experience and we continue to work on understanding and applying these aspects. Students in this project learned many new methods and the results led us to take on new collaborations in geology and enzymology to extend and develop these studies. One recent graduate, Scott Mundle, has taken his knowledge from the project and joined a research group in the field of environmental remediation, where formation of CO_2 is used as a key indicator. Scott's background from our lab has led to new approaches in the environmental field and is widely recognized for its innovation.

"The laboratories provide a supportive environment where work proceeds in the context of interacting research groups and diverse individuals."

2. Blood Substitutes: We also have developed a rational chemical approach to producing an acceptable alternative to red blood cells for transfusion. Using

the cold room and instrumentation within the Davenport Labs was crucial for this work. My students crossed multiple boundaries: organic chemistry into biochemistry, protein science and clinical medicine. Our work in the Davenport Labs was the first to join two hemoglobin molecules by a rational design, an elusive necessity for producing a safe and effective material. As a student, Francine Lui used physical and computational studies on the altered hemoglobins she produced to understand the basis of what makes some materials safer than others. Her publications led to widespread recognition and an invitation to work in a laboratory that studies animal physiology at Harvard Medical School, where she is now a postdoctoral fellow.

3. Unnatural Amino Acids for Proteins: Another interfacial area is the development of a method to make proteins that contain unnatural amino acids. This class of proteins is regarded as a source of new drugs and more suitable therapeutic proteins. The production of such unnatural proteins is difficult because nature is set up to make natural proteins and rejects the unnatural amino acids. We developed chemical reactions that alter transfer RNA directly, so the editing process is circumvented. We used a form of catalysis by lanthanum ions that Lisa Cameron discovered during the course of her Ph.D. research (she is now head of an operating division of Teva Pharmaceuticals).

Outcomes: The diversity of interests and interactions that are promoted by the laboratories have had success in leading students into new careers that go beyond their direct training. Not only are there notable successes in chemistry research and teaching, students have also gone on to business (including entrepreneurs), law (intellectual property), and government. The laboratories provide a supportive environment where work proceeds in the context of interacting research groups and diverse individuals. This has turned out to be a general formula for success for which my students and I are most grateful.

Research Training

During the time in the Davenport Building, my group has typically consistent of six graduate students, most of whom have gone on to receive Ph.D. degrees, and one postdoctoral fellow. In addition we usually have two fourth year research students (Chemistry 449) and two second year research opportunity students who enroll in Chemistry 299. We also regularly host student visitors from Europe.

Current Students and Researchers

Graduate Students

Raj Dhiman
LIliana Guevara
Yi Han
Sohyoung Her
Graeme Howe
Adelle Vandersteen
Elizabeth Wilson

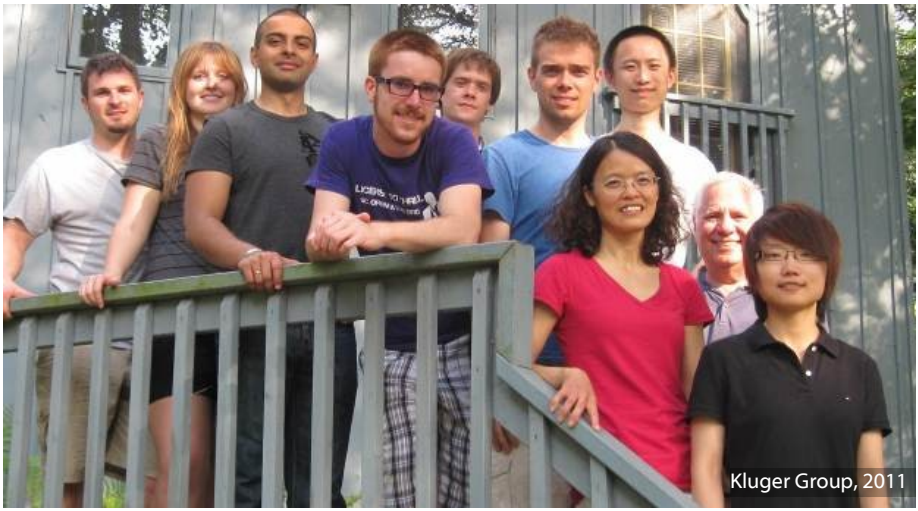
Former Students and Researchers

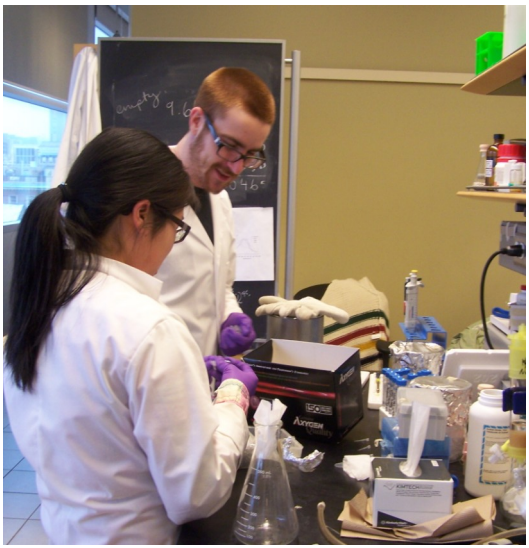
Graduate Students	Current Position
Daniel Bator (2011, MSc)	Brampton
Tara Andrusiak (2009, MSc)	Medical student, UWO
Steven Rathgeber (2009, MSc)	Medical student, UBC
Shannon Bunn (2009, MSc)	Medical student, UofT
Scott Mundle (2010, PhD)	Postdoctoral Fellow, University of Toronto
Francine Lui (2011, PhD)	Research Fellow, Massachusetts General Hospital
Dongxin (Cindy) Hu (2009, PhD)	Industry Researcher, Toronto
Glenn Ikeda (2008, PhD)	Patents and Legal Specialist, Teva Novopharm
Svetlana Tzvekova (2008, PhD)	Research Scientist, pharmaceuticals Toronto
Daria Yu (2007, PhD)	Staff Scientist, Cangene
Amer Alagic (2004, PhD)	Homemaker
Amber Asad (2005, PhD)	Senior Scientist, Cangeen Corporation
Steven Brookes (2003, PhD)	R&D, Novopharm
Lisa Cameron (2004, PhD)	Development Scientist, Taro Pharmaceuticals
Nikolai Gourianov (2005, PhD)	Senior Scientist, ROCHE
Qingyan Hu (2006, PhD)	Senior Research Scientist, Custom Biologics
Ian Moore (2003, PhD)	Corporate Salesperson
Noam Ship (2005, PhD)	Staff Scientist, Apotex Research
Jie (Jessie) Zhang (2005, PhD)	

Postdoctoral Fellows	Current Position
Ying Yang (2011)	Senior Research Scientist, CanAm Bioresearch Inc.
John Pezacki (2001)	Senior Scientist, NRC Steacie Institute
Kibur Hunie Tesfa (2009)	Homemaker
Ian Gray (2006)	Head of Scientific Coordination, Nordic Pharma
Jonathan Foot (2009)	Director of Chemical Research, Pharmaxis
Sandra Dillinger (2006)	France

Undergraduate Students

2008: Raphael Dong (UofT)
2005: Katherine Monkman (UofT), Roseanna Lai (UofT),
2003: Ivan Ho (UofT)
2001: Ekaterina Safroneeva (UofT)


Kluger Group, 2011



Lautens Research Group

In 1986 I accepted a tenure track faculty position and moved into the Lash Miller Laboratories in the summer of 1987. While issues such as lack of fumehoods and air handling in the 25 year old building were a considerable problem, there were features that were viewed as so vital that we incorporated them into our design of the Davenport Building.

I was fortunate to be invited to join the Architect Selection Committee and Design and Implementation Committee and over a period of nearly two years we met regularly as we worked to balance our wishes with a realistic budget. Our goal was to incorporate the best of what we already had, with state-of-the-art space that would last for many years. For instance "outer offices" in the Lash Miller became group rooms in the Davenport Building, and we clustered offices at each end of the hall to promote collegiality. We wanted students to benefit from maximum light and clear sight lines for safety so equipment rooms were placed closest to the hallways. Labs were open concept to deal with the natural growth and shrinkage of research groups as funding came and went. Fume hoods were the highest priority. We had to work within the footprint of the existing undergraduate wing, on which we would add the two floors of research space. Watching the wing take shape as the envelope was completed was followed by many discussions of furnishings and layout. It was an exhilarating experience to see concepts turned into concrete (literally and figuratively) structures.

"By having labs that are second to none, I have been fortunate to attract many people with undergraduate, postgraduate or postdoctoral scholarships."

The firm of Diamond and Schmidt turned our ideas into reality and in 2000 we moved into shiny new, spacious and safe labs. Of course our current generation of students simply appreciate what we have, but those students who had spent time in both knew just how fortunate we were and were thankful for the generosity shown by the Davenport family. The ancillary effects of being able to renovate all of Lash Miller followed so that it is safe to say everyone in the department was the beneficiary of the gift. Our Chairs, Martin Moskovits and later David Farrar and Scott Mabury were energetic visionaries who oversaw the projects and made sure they came in on time and on budget.

Perhaps the biggest consequence of new space was that we were able to attract even more highly talented graduate students who viewed our space as being equal or better than what was available at other top departments. In fact my group grew from 12-14 to as high as 31 over the

span of five years. We have now settled in around 18-24 students, postdoctoral and short term visitors at any point in time. 24 PhD's along with ten MSc's, 51 postdoctoral fellows and >75 undergraduates and visitors have come through my lab in just the past decade. They have found jobs in industry, academia, medicine and patent law. They are an exceptional group of people who deserve all the success they have achieved and will achieve in the coming decades. By having labs that are second to none, I have been fortunate to attract many people with undergraduate, post-graduate or postdoctoral scholarships. In fact of the 51 pdf's, >80% have brought full or partial funding from Europe, the UK, Asia and North America. This amounts to $1.5M in postdoctoral funding alone, to educate people in the Davenport Building. More than half of the PhD's who left the group were rewarded with post-doctoral fellowships at top laboratories in the US, Canada, the UK and Europe.

The new space also made it possible for us to attract the best senior and junior faculty to join our ranks. We hired Doug Stephan to a Canada Research Chair from the University of Windsor just as he was launching an exciting new research venture and he has been phenomenally successful and brought great esteem to the department. In addition we appointed Vy Maria Dong as an Assistant Professor and seen her have a meteoric rise to prominence. Both work in the fields of catalysis and "sustainable chemistry." In fact their success, along with the others has meant we rapidly filled the new space and now seek new space to accommodate the growth.

It is fair to say that the construction of the Davenport Building and the accompanying research funding that flowed from AstraZeneca, Merck Frosst and NSERC did more to improve my research situation than I could have ever dreamed. I will be forever grateful for the generosity of Mrs. Edna Davenport on behalf of her husband and children. They have moved the department into the 21st century and set us on a path of greater and greater success. It was my pleasure to fly to Florida to meet her and that will be a lasting memory for me and an inspiration on how to give back to make others have a better opportunity.

Research Interests

The goals of our research program are to invent new chemical reactions that make useful biologically active compounds by using catalysts based on metal complexes. After discovering or optimizing these reactions we seek to apply the methods to the synthesis of natural products that have useful biological activity, to the synthesis of known medicinal agents or scaffolds that are commonly occurring in drug-like substances. Over the years we have made molecules that have anti-depressant activity, cholesterol-lowering activity, anti-cancer activity and a host of other biological effects. In addition to making the final target, we want to highlight the advantages of using our methodology. In some instances we make molecular scaffolds

that are not easily made or impossible to make by other methods and we hope that some day these structures will find their way into the next generation of therapeutics.

One way we have contributed is in "asymmetric synthesis" wherein we make only one of two "hands", known as enantiomers. Keith Fagnou, a former graduate student, mobilized a team who invented a suite of reactions using rhodium catalysts that are 100% atom economic, meaning that all the elements of the two starting materials are incorporated into the product. The products of this reaction were produced on scale by Solvias and are sold by Aldrich as a "scaffold kit" for medicinal chemistry research.

We were early contributors in the field of "C-H activation" which has become one of the most active areas in recent years. Selective functionalization of carbon-hydrogen bonds which are not activated in any way is one of the "holy grails" or chemical synthesis. We developed many synthetically useful C-H functionalization reactions based on a process first reported by Marta Catellani in Italy in 1997.

Most recently we have worked in developing tandem or domino reactions wherein multiple reactions occur in the same flask which avoids the need for workup and purification. Such processes are potentially more attractive because they are less wasteful of solvent and time.

The pharmaceutical industry has undergone a dramatic shape up in the past few years but it is clear that highly trained chemists are needed both to invent the next generation of medicines but also to take the structures that are identified and develop practical syntheses that minimize environmental impact and are maximally selective and efficient.

Current Students and Researchers

Graduate Students
David Candito
Jane Panteleev
Gavin Chit Tsui
Steve Newman
Lei Zhang
Shabnam Yazdi
Jenny Howell
Jennifer Tsoung
Mohamed El-Salfiti
Jackie Schulman
Chan Lau

Postdoctoral Fellows
Xiaodong Jia
Jiangtao Zhu
Hasnain Malik
Patrick Franke
Patrick Liu
Juliane Keilitz

Visiting Faculty:
Xiao-Dong Jia (Northwest Normal University, China)

Former Students and Researchers

Masters Students	Current Position
Nik Nguyen (2010, MSc)	Scientist, Toronto Research Chemicals
Marc-Olivier Turcotte-Savard (2010, MSc)	PhD Student, Université Laval
Bing Yu (2010, MSc)	Scientist, Novartis
Sharon Husak (2007, MSc)	Medical Student, University of Alberta
Vangelis Aktoudianakis (2006, MSc)	Scientist, Gilead Sciences
Christina Schwarz (2005, MSc)	Patent Lawyer, New York City
Anh Chau (2004, MSc)	Scientist, Toronto Research Chemicals
Jasmine Zunic (2002, MSc)	Scientist, Amira Pharmaceuticals
Andrei Lutchnikov (2001, MSc)	PhD Student, Scripps Research Institute
Amelie Roy (2000, MSc)	Scientist, Pfizer

Doctoral Students	Current Position
David Chai (2011, PhD)	Postdoctoral Fellow, University of Chicago
Robert Webster (2010, PhD)	Postdoctoral Fellow, Ludwig Maximilians Universitat Munchen

Doctoral Students (cont.)	Current Position
Frederic Menard (2010, PhD)	Postdoctoral Fellow, Stanford University
Praew Thansandote (2010, PhD)	Postdoctoral Fellow, University of Cambridge
Christopher Bryan (2010, PhD)	Postdoctoral Fellow at Australian National University
Alena Rudolph (2009, PhD)	Scientist, Alphora Research
Andrew Martins (2009, PhD)	Scientist, Gilead Sciences
Brian Mariampillai (2008, PhD)	Scientist, GreenCentre Canada
Nai-Wen Tseng (2008, PhD)	Scientist, Filligent
Mark Scott (2007, PhD)	Scientist, Merck
Paul Leong (2007, PhD)	Scientist, Lonza
Y. Eric Fang (2006, PhD)	Scientist, Amgen
Dino Alberico (2005, PhD)	Scientist, Alphora Research
Matthew Maddess (2005, PhD)	Scientist, Merck
Christopher Dockendorff (2005, PhD)	Scientist, Broad Institute
Jean-Francois Paquin (2005, PhD)	Professor, Université Laval
Stephane Ouellet (2003, PhD)	Scientist, Merck
Sheldon Hiebert (2003, PhD)	Scientist, Bristol Myers Squibb
John Mancuso (2003, PhD)	Scientist, Tranzyme
Wooseok Han (2003, PhD)	Scientist, Novartis
Tim Stammers (2002, PhD)	Scientist, Boehringer Ingelheim
Valentin Zunic (2003, PhD)	Patent agent, San Diego
Keith Fagnou† (2002, PhD)	Professor, University of Ottawa
Gregory Hughes (2001, PhD)	Scientist, Merck

Postdoctoral Fellows	Current Position
Dr. Norman Nicolaus (2011)	Researcher, RWTH Aachen University
Dr. Alistair Boyer (2011)	Postdoctoral Fellow, University of Glasgow
Dr. Clemence Liebert (2010)	France
Dr. Matthew Blanchot (2010)	Scientist, BASF
Dr. Marcel Suhartono (2010)	Scientist, Lonza
Dr. Karolin Geyer (2010)	Scientist, BASF
Dr. Marion Brinks (2010)	Scientist, BASF
Dr. Katja Kraemer (2010)	Scientist, AZ Electronic Materials
Dr. Jason Bexrud (2010)	Scientist, Alphora Research
Dr. Jacki Kitching (2009)	Scientist, Australian Nuclear Science and Technology Organisation
Dr. Roberto Pela (2009)	Researcher, Institute Catala d'Investigacio Quimica
Dr. Angelica Aguilar (2009)	Scientist, TAPI Services, Teva Group
Dr. Valentina Aureggi (2008)	Postdoctoral Fellow, ETH Zürich
Dr. Kersten Gericke (2008)	Scientist, Bayer

Postdoctoral Fellows (cont.)	Current Position
Dr. Michael Langer (2008)	Scientist, Celanese Chemicals Europe
Dr. Lars Arve (2008)	Scientist, Bayer
Dr. Christian Boeing (2008)	Scientist, Evonik Industries AG
Dr. Benoit Laleu (2007)	Scientist, GenKyoTex
Dr. David Hulcoop (2007)	Scientist, GlaxoSmithKline
Dr. Matthew Fleming (2007)	Scientist, Solvias AG
Dr. Yann Bethuel (2007)	Scientist, Finorga (Groupe Novasep)
Dr. Masatoshi Nagamochi (2007)	Scientist, Daiichi Sankyo
Dr. Catherine Tailler (2006)	Scientist, Institute de Recherche en Chimie Organique Fine de Rouen
Dr. Bernhard Brunner (2006)	Scientist, BASF
Dr. Christophe Blaszykowski (2006)	Scientist, Medmira
Dr. Josephine Yuen (2006)	Scientist, GlaxoSmithKline
Dr. Aude Fayol (2006)	Scientist, Sanofi
Dr. Nils Rackelman (2006)	Scientist, Sanofi
Dr. Stefan Sahli (2006)	Scientist, Sika Technologies
Dr. Yong-Hwan Cho (2006)	Scientist, Mitsubishi
Dr, Helen McManus (2006)	Scientist, Pfizer
Dr. Tim Chapman (2005)	Scientist, Medical Research Council, England
Dr. Christelle Herse (2005)	Scientist, Lonza
Dr. Cyril Bressy (2005)	Professor, Université Marseille
Dr. Maren Fuerst (2005)	Scientist, Syngenta
Dr. Koichi Mitsudo (2004)	Professor, Okayama University
Dr. Tzvetelina Marquardt (2004)	Professor, University of Vienna
Dr. Udo Marquardt (2004)	Scientist, Green Hills Biotechnology
Dr. Graham McGowan (2004)	Scientist, Alphora Research
Dr. Ting Kang (2003)	Scientist, Targanta Therapeutics
Dr. Eiji Tayama (2003)	Professor, Niigata University
Dr. Bernard Leroy (2003)	Professor, Université Louvain
Dr. Sandrine Pache (2003)	Scientist, AstraZeneca
Dr. Gerald Mehlteretter (2003)	Scientist, SGL Carbon
Dr. Guo Sheng (2002)	Professor, Neimeng Minority University
Dr. Masahiro Yoshida (2002)	Professor, Tokushima University
Dr. Duy Nguyen (2002)	Scientist, Bayer
Dr. Nicolaus Bieler (2001)	Scientist, Lonza
Dr. Koihciro Fukuoka (2000)	Scientist, Takeda Chemicals
Dr. Marc Dahlmann (2000)	Scientist, BASF
Dr. Stephane Raeppel (2000)	Scientist, ChemRF Inc.

Morris Research Group

My group of three graduate students and a research associate moved to the Davenport Labs in the fall of 2000. It was an exciting time to reorganize the lab and to head off in new directions with the access to many more fume hoods and more glovebox space. Over the past ten years my group has grown so that the lab is constantly full with five to six graduate students, a postdoctoral fellow and an undergraduate student. The new space and the growing reputation of our graduate program have meant that I have been able to attract excellent students with their own scholarships, something that was rare before 2000. It meant that I could take on additional research activities including a contract with a perfume company. Over the 10 year period our group has published 64 articles, five book chapters, six patent applications, four PhD theses and four MSc theses.

The Davenport donation resulted in other matching funds for the Department that allowed Chairs David Farrar and Scott Mabury to renovate the space that we vacated. The vintage, dirty 1960 labs were transformed into pristine new labs now used to build an internationally known group of environmental chemists that now consists of Mabury, Donaldson, Abbatt and Murphy on this campus with three more on the Scarborough campus.

Research Interests

My group has always been known internationally for work on the reactions of hydrogen with soluble transition metal complexes and the structures observed. Upon moving to the Davenport Labs, this background allowed me and my group to move into the development and study of catalysts for hydrogenation. Hydrogen is one of the top chemicals produced in industry and its reactions are conducted in industry on the largest scale on earth. This chemistry will become more important as hydrogen is produced from water using sunlight as a clean source of energy. We had a breakthrough in 2008 when we discovered that certain complexes of iron can replace less environmentally friendly ruthenium catalysts in a hydrogenation reaction that results in the synthesis of alcohols of value in the fragrances and pharmaceutical industry.

"The new space and the growing reputation of our graduate program have meant that I have been able to attract excellent students with their own scholarships, something that was rare before 2000."

Current Students and Researchers

Graduate Students
Wylie O
Alexandre Mikhailine
Paraskevi Lagaditis
Peter Sues
Demyan Prokopchuk
Jessica Sonnenberg
Kanghee Park

Postdoctoral Fellows
Weiwei Zuo

Visiting Professor
Faraj Hasanayn (American University of Beirut)

Morris Group, 2011

Morris Group attending the 2009 Inorganic Discussion Weekend at the Guelph University

Former Students and Researchers

Graduate Students	Current Position
Marco Zimmer-De Iuliis (2009, PhD)	Postdoctoral Fellow, UTM
Sean Clapham (2007, PhD)	Business, Toronto
Alen Hadzovic (2006, PhD)	Lecturer, Department of Physical and Environmental Sciences (DPES), University of Toronto Scarborough
Tianshu Li (2005, PhD)	Postdoctoral Fellow, Universitat Kärlsruhe
Terry Fedorkiw (2003, MSc)	Marketing Manager, Nelson Education
Justin Hinman (2001, MSc)	Forensics, Ontario Government

Postdoctoral Fellows & Research Associates	Current Position
Nils Meyer (2010)	Chemist, Germany
Alen Hadzovic (2009)	Lecturer, DPES, University of Toronto Scarborough
Christine Sui-Seng (2008)	Chemist, France
Rongwei Guo (2005)	Scientist, Kanata Chemical Technologies
Datong Song (2004)	Assistant Professor, Chemistry, University of Toronto
Raphael Churlaud (2003)	Industry, France

Undergraduate Students

2010: Mazharul Maishan (UofT)

2009: Katharina Mack (Johannes Gutenberg University, Mainz, Germany), Eva Woltmann

2008: Fatme Dahcheh (UofT), Ali Rizvi (UofT)

2007: Dennis Dalmas (UofT)

2006: Amina Mulani (UofT), Xiaoxi Zhao (UofT), Nina Ivanova (UofT), Nipa Haque (UofT), Friederike Freutel (Johannes Gutenberg University, Mainz, Germany), Dennis Dalmas (UofT), Sion Atkin (U. Bristol exchange student)

2005: Ester Pierce (UofT), Christina Maclaughlin (UofT), Katherine Waterston (UofT), Johannes Klos (Johannes Gutenberg University, Mainz, Germany), Duncan Moore (U. Bristol exchange student)

2004: Marco Zimmer-De Iuliis (UofT), Lauren Hails (U. Bristol exchange student), Ines Bergner (Johannes Gutenberg University, Mainz, Germany), Christian Elpelt (Johannes Gutenberg University, Mainz, Germany)

Undergraduate Students (cont.)

2003: Barbara Skrela (UofT), Nailyn Rasool (UofT), Robert Abbel (Johannes Gutenberg University, Mainz, Germany), Marco Zimmer-De Iuliis (UofT), Leonie Soltay (UofT)

2002: Kai Groh (Johannes Gutenberg University, Mainz, Germany), William Au (UofT)

2001: Sean Clapham (UofT), Marc Eberhardt (Johannes Gutenberg University, Mainz, Germany, Michael Faatz (Johannes Gutenberg University, Mainz,

Morris Group and friends, November 2009

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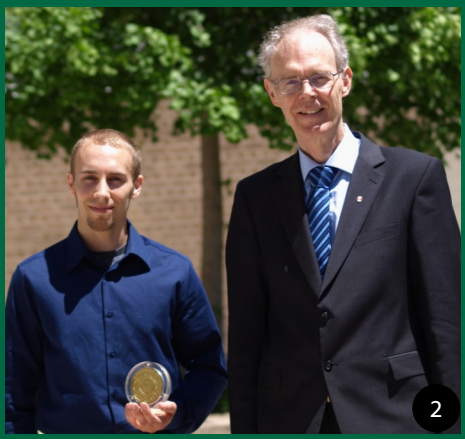
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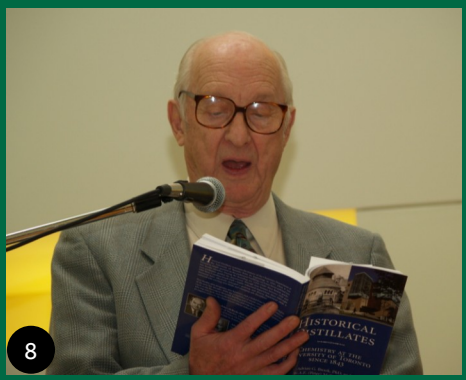
5

1. Minister of State for Science and Technology Gary Goodyear announces in the Davenport Atrium that the government will provide $150 million in grants, scholarships and fellowships through NSERC, July 21, 2009
2. Chair Robert Morris presents Russ Algar (formerly of the Krull Group) with the Chair's Doctoral Prize outside the Davenport Building in 2011
3. Students decorate the "Chemists' tree" during our annual year end party held in the Davenport Building Atrium
4. High school students participate in the Chemistry Olympiad program
5. The incoming class of 2011 graduate students



6. Former Chair Scott Mabury presents David Farrar with a collage of the Davenport Garden throughout the year during his farewell party in 2007
7. Faculty, staff and students attend the opening of the Davenport Garden in 2005
8. Emeritus University Professor Adrian Brook reads from "Historical Distillates", the Chemistry Department's history book at the launch held in the Davenport Building Atrium, March 2007
9. The Chem Club hosts their annual Halloween party in the Davenport Building Atrium
10. Awards recipients and donors during the Awards Reception held in the Davenport Building Atrium in June 2011

Nitz Research Group

I joined Chemistry at the University of Toronto in 2004 and had the good fortune to establish my research group in the Davenport Building. I had some difficult decisions to make as to which University to join to start my career and there is no question that the availability of this space was an impressive component of the recruitment package. The Nitz lab has now grown to 12 students and postdocs and we occupy two labs in the Davenport Building. The quality of the laboratory space has allowed me to attract high quality students and postdoctoral fellows and has made our group highly productive in many areas of biological chemistry.

Research Interests

Biological chemistry lies at the interface of multiple traditional disciplines including biochemistry, organic and analytical chemistry. The Nitz lab takes advantage of the powerful techniques provided by organic chemistry to assemble tools to understand biological problems. We have focussed our efforts in two areas, the understanding of bacterial infec-tions and new methods to diagnose disease.

"The quality of the laboratory space has allowed me to attract high quality students and postdoctoral fellows and has made our group highly productive."

Bacterial infections, once considered conquered by the modern development of antibiotics, instead remain a serious problem, causing illness, long term disability and, in extreme cases, death. This threat is compounded by the increasing resistance of many bacteria to antibiotics, so that now, for many infections, doctors are running out of options. A key mechanism by which bacteria establish persistent infections is sticking to a surface at the site of infection. It has been estimated that 65% of bacterial infections are caused by bacteria sticking to surfaces. The surface can be a medical implant such as a life-saving heart valve or a life-changing hip replacement—clearly avoidance of these materials is not an option. Even more alarmingly, bacteria can stick to the surface of our own body's tissues, such as a tooth or lung. Once bacteria stick to any of these surfaces, they are far more resistant to antibiotics and to the host's immune system. The focus of our research is to understand the 'glue' that bacteria use to stick to surfaces. We aim to determine the chemical and biological details of how this glue is made by the bacteria, and in doing so we will learn at which points we may be able to block its production. We will then use chemistry to make new molecules to attack these points of weakness in the glue production pipeline. The new molecules we will find to block the ability of bacteria to stick to surfaces will help determine how best to develop new therapies in the war against bacterial infections. The diagnosis of disease was once limited by the symptoms expressed by

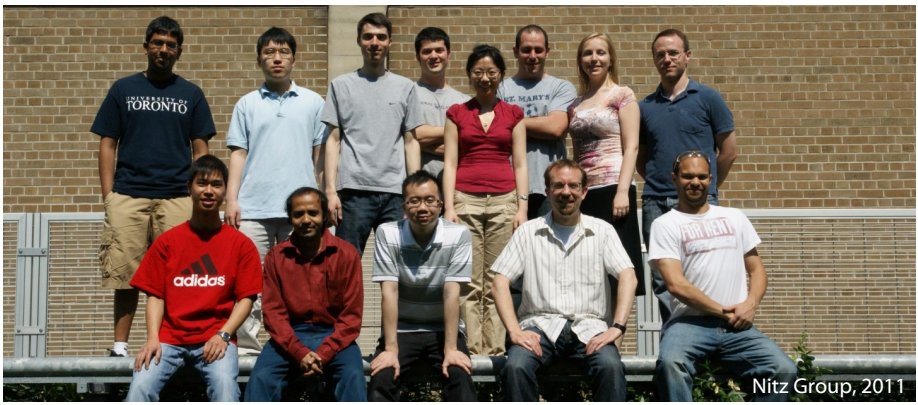
the patient and the ability of the doctor to classify these symptoms. Medicine has come a long way since this time but doctors still seek a more informed diagnosis of a disease and, more recently, how to personalize the treatment of a disease to an individual patient. We are working with a team at the forefront of realizing the goal of personalized medicine. Together we have developed reagents and an instrument, called a mass cytometer, able to fingerprint diseases such as leukemia, which will allow treatments to be tailored to the specific characteristics of a person's disease. These instruments are being adopted across the world in research labs and we hope to see them in hospitals in the future. Our important contribution to this project has been to develop chemistries that work in conjunction with the biological assays.

Graduate students and postdoctoral fellows from my lab have gone on to research labs and faculty positions across the globe. All of these students have benefited immensely by the ideal research space in the Davenport Building.

Current Students and Researchers

Graduate Students
Anthony Chibba
Pengpeng Cao
Landon Edgar
Rodolfo Gomez
Ben DeFrancesco
Nesrin Vergun
Landon Edgar

Postdoctoral Fellows
Somnath Dasgupta
Varvara Pokrovsa
Yunshan Sun



Nitz Group, 2011

Former Students and Researchers

Graduate Students	Current Position
Jason Chio (2010, MSc)	Staff Scientist, McMaster PET Imaging Centre
Caroline Paul (2009, MSc)	PhD Student, University of Barcelona
Anna Gudmundsdottir (2009, PhD)	PhD Student, University of Iceland
Grace Ng (2009, MSc)	Scientist, Contract Synthesis Company
Heather Griffiths (2009, MSc)	
Carmen Leung (2008, MSc)	Winnipeg
Urja Lathia (2008, MSc)	MBA student, York University
Yedi Sun (2007, MSc)	PhD student, Kyoto University
Jimena Sauceda (2006, MSc)	PhD Student, Ludwig Maximilians-Universität München

Postdoctoral Fellows	Current Position
Richard Jagt (2008)	House husband and aspiring rock star
Lehua Deng (2008)	Scientist, Contract Synthesis Company
Guoha Zhang (2007)	Scientist, Contract Synthesis Company
Shamsur Rahman (2006)	India

Research Associates	Current Position
Michael Leipold (2011)	Research Associate, University of California San Francisco


Nitz Group, 2006

Undergraduate Students

2011: Isabel Mackay-Clackett (UofT), Landon Edgar (UofT)

2010: Dimitriy Malyshev (UofT), Kevin Singh (UofT), Bill Kim (UofT)

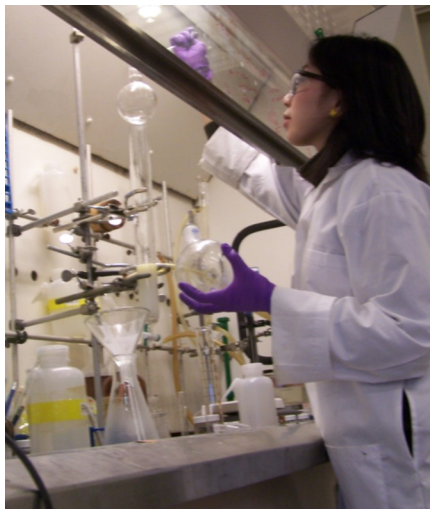
2009: Dimitriy Malyshev (UofT), Brian de la Franier (UofT), Bill Kim (UofT), Richard Huang (UofT)

2008: Yosra Saad (UofT), Jason Chio (UofT), Lulu Wang (UofT)

2007: Sandra Spadaro (UofT), Joe Leung (UofT)

2006: Joe Leung (UofT), Rob Karisch (UofT), Pragma Roy (UofT)

2005: Matias Ding (UofT), Priyanka Mallik (UofT), Carol Wang (UofT), Nune Zadikian (UofT), Amina Mulani



Nitz Group, 2008

Song Research Group

I was hired by the University of Toronto in July 2006 and started to build my research group in the Davenport Building. There is no doubt that being able to work in the state-of-the-art laboratories in the Davenport Building carried a lot of weight in the job offer. The quality of the lab space has also been important for me to recruit high quality graduate students over the past five years. My research group has grown from one graduate student and one postdoctoral fellow in 2006 to five graduate students, two postdoctoral fellows, two undergraduate students, and a few visiting students in 2011. We have published 20+ peer reviewed papers since 2006, won many awards and honours as a group, and established collaborations with several academic and industrial partners. For all the success, we are highly grateful.

Research Interests

Our broad research interests include synthetic inorganic chemistry, organic methodology, organometallic chemistry, small molecule activation, homogeneous and heterogeneous catalysis, and luminescent materials (sensors and emitters for LED). A few projects are highlighted below.

1. Metal-organic frameworks (MOFs) as sensors and heterogeneous catalysts: Compared to transition metal MOFs, lanthanide MOFs are rare because of the irregular coordination geometry of lanthanide ions. Despite the challenge, lanthanide MOFs are interesting to us, because of the inherent luminescent properties from lanthanide ions and the strong Lewis acidity and distinct oxophilicity of lanthanide ions. This project includes two aspects: MOFs as luminescent sensors and heterogeneous catalysts. In addition to lanthanide MOFs, we also develop transition metal-based MOFs containing active catalytic sites as reusable catalysts. In the cases that involve biomimetic catalytic sites, we tend to view the MOFs as active site-enriched artificial enzymes.

"We have published 20+ peer reviewed papers since 2006, won many awards and honours as a group and established collaborations with several academic and industrial partners."

2. Palladium-Catalyzed Vicinal Difunctionalization of Olefins: We have developed a novel method to dioxygenate alkenes using cationic Pd catalysts. In comparison to related vicinal oxidations, a broad range of olefins can be functionalized in both inter- and intramolecular processes. The catalyst bears two important structural features: an electron-rich diphosphine ligand and non-coordinating counterions. This is the first time that phosphine ligands are introduced in Pd(II)/Pd(IV) catalyzed oxidation systems. Thus, the use of

chiral phosphine ligands may lead to the asymmetric dioxygenation of alkenes. More recently, we have developed another Pd-catalyzed vicinal difunctionalization of olefins, intramolecular carboesterification of olefins. The produced 6,7,5-fused ring system is the core structure of a series of anti-HIV drugs.

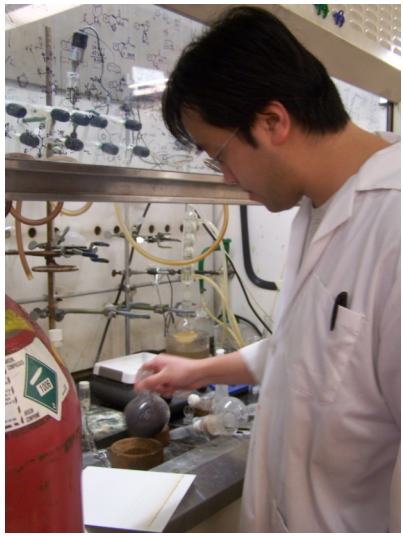
3. Ru-CNN pincer complexes for catalysis: The Milstein group demonstrated that the water-splitting reaction can be achieved on a single Ru centre using a Ru-PNN pincer complex (*Science* 2009, *324,* 74). This is fundamentally important and novel, but plagued with problems: (1) the H_2-releasing step requires high temperature (2) the phosphine ligand gets oxidized by the resulting O_2 and H_2O_2 quickly, causing the decomposition of the catalyst. To solve these intrinsic problems, our group designed a new series of pincer ligands with an NHC-arm instead of phosphine -arm. The incorporation of the NHC arm serves two purposes: (1) because the NHC is more electron-donating than phosphines, it could make the hydride more hydridic and thus facilitate the H_2 releasing step; (2) late-metal NHC compounds are quite stable and more robust against oxidation, compared to the corresponding phosphine complexes. While the water-splitting reactivity of this family of complexes is being investigated, we have discovered that these Ru-CNN complexes can catalyze a variety of transformations, including the hydrogenation of ketones and esters, condensation of alcohols to afford esters, condensation of alcohols and amines to yield amides or imines, dehydrogenative oxidation of alcohols to carboxylic acid, and direct coupling of two primary alcohols to give alkenes and alkanes. Milstein's Ru-PNN complex also catalyzes the hydrogenation of unactivated esters. In comparison, our Ru-CNN complexes are much more active catalysts for ester hydrogenation with more than 100 fold higher turn-over frequencies.

Current Students and Researchers

Graduate Students
Vincent Annibale
Yu Li
Trevor Janes
Phillip Gregorie
Charlie Kivi
Daying Liu

Postdoctoral Fellows
Tao Bai

Undergraduate Students
Christian Koehler

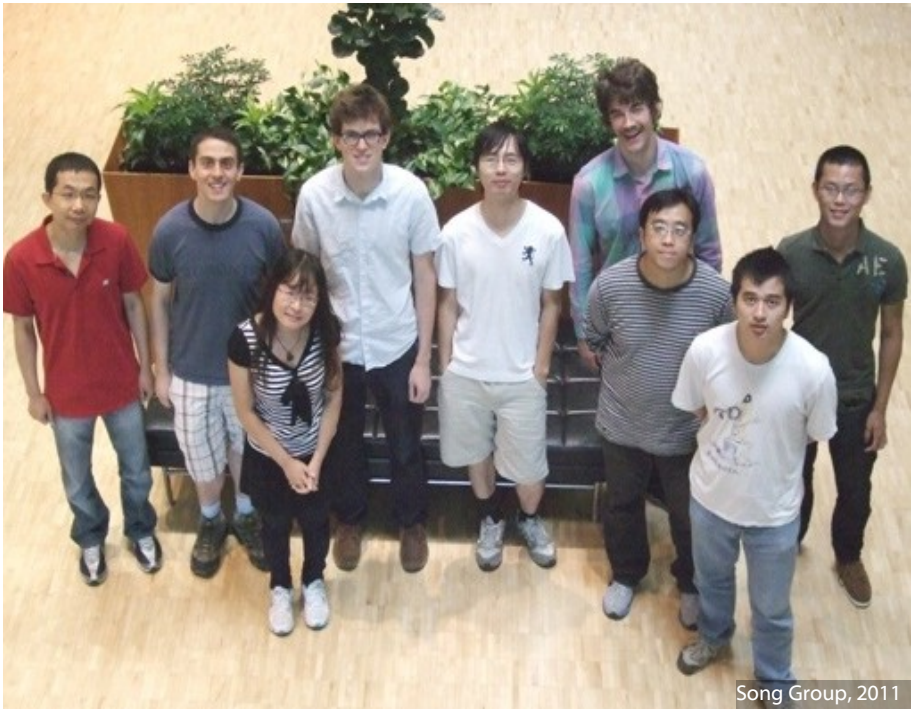


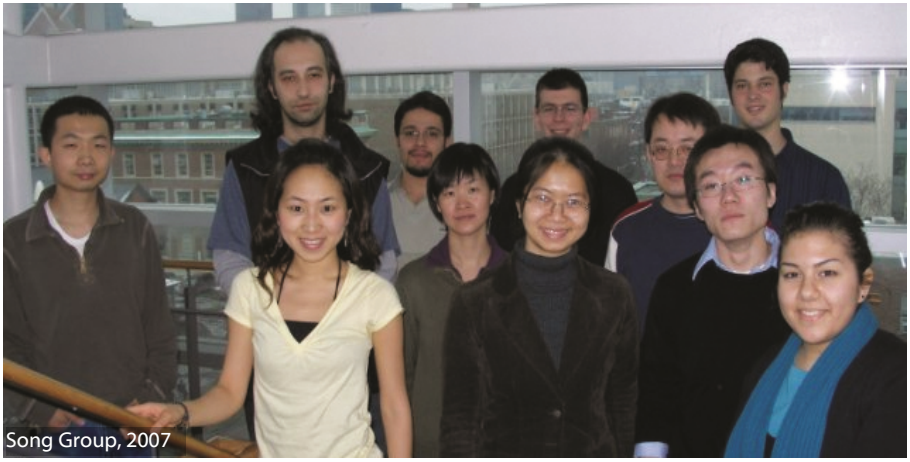
Former Students and Researchers

Graduate Students	Current Position
Runyu Tan (2011, PhD)	Postdoctoral Fellow, MIT
Elzbieta Stepowska (2009, MSc)	Research Scientist, Germany
Bich Tram Nguyen Pham (2008, MSc)	High school Teacher, Toronto
Ali Nazemi (2010, MSc)	PhD Student, University of Western Ontario
Liisa Lund (2008, MSc)	Finland

Postdoctoral Fellows	Current Position
Alen Hadzovic (2009)	Lecturer, DPES, University of To-Scarborough
ronto	
Yang Li (2009)	Postdoctoral Fellow, MIT
Huiling Jiang (2008)	Postdoctoral Researcher, University of South Florida
Vijendran Vijaikanth (2006)	India

Undergraduate Students:
2010: Christian Koehler (UofT) , Daniel Kozera (PhD student, MIT)


Song Group, 2011


Song Group, 2007

Stephan Research Group

We moved to the University of Toronto at the beginning of 2008 and we occupy two labs in the Davenport Building. There is no question that the availability of this space was an impressive component of the recruitment package. Moreover, the quality of this space has meant that our group has been able to be extremely productive in the past 3.5 years, publishing over 80 papers since the move. My group has grown from about 12 previous and is approaching 30 students and postdoctoral fellows in Toronto. When asked about the move, I often respond: "I'm living the dream". The labs and offices in the Davenport Building play a big part in facilitating "the dream." For that, I am extremely grateful.

Research Interests

Catalysts are molecules that facilitate a desired chemical reaction. Our research broadly targets the development of catalysts for a variety of reactions derived from either main group or transition metal compounds. In the past we have developed metal -based catalysts that are used commercially to produce plastics. In Toronto, one of the projects involves the development catalysts that target the modification of rubbers. Such modifications provides long term stability and broadens the range of applications for such materials.

"I'm living the dream. The Davenport labs and offices play a big part in facilitating "the dream." For that, I am extremely grateful."

A second area of interest for us is derived from a recent (2006) discovery in our group of a unique approach to the utilization of small molecules in chemistry derived from the combination of simple main group compounds. We were the first to demonstrate the notion of so-called "Frustrated Lewis Pairs" which provide the first metal-free, reversible reactions with hydrogen. This has led to the development of metal-free catalysts for the hydrogenation of organic compounds. This area has garnered much attention and we are working hard to stay in a leading position, as many researchers around the world have entered the area. We are focusing on ways to use this new chemistry to convert CO2 to liquid fuels. While a challenging target, the potential impact of such a development would be dramatic.

Current Students and Researchers

Graduate Students

Mike Boone
Chris Brown
Chris Caputo
Fatme Dahcheh
Jeff Farrell
Stephanie Granville
Tayseer Mahdi
Adam McKinty
Gabriel Ménard
Rebecca Neu
Shawn Postle
Conor Pranckevicius
Sanja Resanovic
Mike Sgro
Xiaoxi Zhao

Postdoctoral Fellows

Ahmed Abouletta
Renan Cariou
Roman Dobrovetsky
Johannes Dömer
Jillian Hatnean
Lindsay Hounjet
Chunfang Jiang
Liyuan Liang
Jason Morton
Tongen Wang

Stephan Group, 2011

Former Students and Researchers (in Toronto)

Graduate Students	Current Position
Cheryl Tanur (2011, MSc)	Project Development Coordinator, Oakville
Stephen Geier (2010, PhD)	Postdoctoral Fellow, University of California Berkley
Danny Hickie (2010)	Graduate Student, University of Toronto
Meghan Dureen (2010, PhD	Law student, University of Toronto
Erin Gwynne (2010, MSc)	Law student, Queen's University
Kanwarpal Multani (2010, MSc)	Mississauga
Sharonna Greenberg (2009, PhD)	Assistant Professor, Ryerson University
Travis Ancelet (2009, MSc)	Graduate student, Victoria University of Wellington

Postdoctoral Fellows	Current Position
Sharonna Greenberg (2010)	Assistant Professor, Ryerson University
Zachariah Heiden (2010)	Scientist, Pacific Northwest National Laboratories
Clinton Lund (2010)	Scientist, LANXESS
Louisa Stanlake (2010)	Scientist, Kelsan Technologies
Edwin Otten (2010)	Assistant Professor, University of Groenigen, Germany
Birgit Birkmann (2010)	
Ian Blackmore (2009)	Scientist, Saudi Basic Industries Corporation (SABIC)
Matthias Ullrich (2009)	Scientist, Evonik Degussa GmbH
Alberto Ramos (2009)	Research Associate, Universidad de Oviedo
Maria d. Consuelo Mendoza (2009)	Researcher, Universidad Autonoma de Herrera Puebla

Research Associates	
Zachariah Heiden (2011)	Scientist, Pacific Northwest National Laboratories
Clinton Lund (2011)	Scientist, LANXESS
Todd Graham (2010)	Scientist, Cytec
Ian Blackmore (2010)	Scientist, SABIC
Preston Chase (2008-2009)	Sr. Development Scientist, GreenCentre Canada

Visiting Graduate Students and Researchers

2011: Yohann Gautier (Université de Rennes, France), Anne Kraft (Universität Freiburg, Germany), Daniel Winkelhaus (Universität Bielefeld, Germany)
2010: Ilona Peuser (Universität Münster)
2009: Tanja Voß (Universität Münster), Marcus Klahn

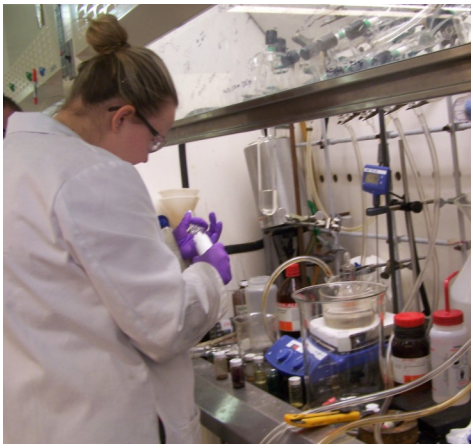
Stephan Group, 2008

Undergraduate Students

2011: Frederick Chiu (UofT), Sarah Hughes (UofT), Christoph Kreitner (Universität Mainz), Conor Pranckevious (UofT), Lina Tran (UofT)

2010: Michael Schedler (Universität Mainz) Eva Ouyang (UofT), Robert Di Lorenzo (UofT), Silke Froemel (Universität Münster), Frederick Chiu (UofT), Mikheil Gogiashvili (Universität Münster), Tayseer Mahdi (Ryerson University), Fatme Dahcheh (UofT), Sanja Resanovic (Ryerson University), Conor Pranckevicius (UofT)

2009: Veronika Beer (Universitat Mainz), Cheryl Tanur (University of Guelph), Mike Jones (UofT), Mengzhou Li (UofT), Peter Sues (UofT), Juliette Berthe (École Polytechnique), Eva Ouyang (UofT), Adam McKinty (University of Alberta)



2008: Erin Gwynne (Mount Allison University), Xiaoxi Zhao (UofT), Kelvin Seto (UofT), Miranda Skjel (University of Victoria), Christoph Glotzbach (Universität Münster), Lukas Reck (École Normale Supérieure)

Yudin Research Group

The Davenport Building facilities have been absolutely first rate and have enabled us to do exciting science. Our excellent research labs have served as a perfect recruitment tool and enabled us to secure funding from diverse sources including Canadian Institute of Health Research, Ontario Genomics Institute, Ontario Institute of Cancer Research, NSERC (discovery and strategic programs), and others. A start-up company, Encycle Therapeutics, is being incubated out of the Davenport Building in collaboration with MaRS Innovations. Our students have forged ties with industrial collaborators (e.g. GlaxoSmithKline) and have had an opportunity to test their discoveries in the real world. For that we are extremely grateful to the infrastructure offered by the Davenport Building.

Research Interests

The Yudin lab designs new chemical transformations using the powerful tools of metal catalysis, electrochemistry, and organic synthesis. Their earlier work in the Davenport Building employed fluorinated ligands such as F_8BINOL and their derivatives. As a result, new catalyst systems and materials with improved stability and selectivity have been developed. Practical electrosynthetic transformations are another important contribution from the Yudin lab. His lab's innovative approach bypasses the requirement for stoichiometric or catalytic amounts of metal additives and stoichiometric oxidants in organic redox reactions. Studies in transition metal catalysis have helped solve the long-standing challenge of palladium-catalyzed nitrogen transfer.

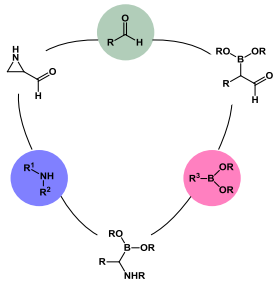
"The Davenport Building facilities have been absolutely first rate and have enabled us to do exciting science. For that we are extremely grateful to the infrastructure offered by the Davenport Building"

The current focus of research in the Yudin group is to develop a bridge between basic research and drug discovery. Toward this goal, Yudin and his students have pioneered the design of new chemical transformations using powerful amphoteric reagents developed in his laboratory. These molecules contain a counterintuitive combination of an electrophile and a nucleophile. The logic behind this chemistry is simple: to impose a kinetic barrier against self-reactivity. The first family of amphoteric reagents developed by the Yudin lab are aziridine aldehydes, bench-stable molecules that streamline the synthesis of complex bioactive compounds. Empowered with his recently developed methods, his lab has solved a significant problem of macrocyclic peptide formation. The Yudin lab has made compounds that

mimic secondary structures such as beta turns, beta sheets, and alpha helices in various contexts. This strategy rapidly generates a multitude of closely related low energy peptide conformers representing different regions of surface-exposed loops and grooves that accurately recreate protein inter-surface binding elements.

Most recently, Yudin and his students discovered another powerful class of amphoteric reagents – alpha boryl aldehydes. This fundamental advance strikes at the heart of fundamental organic reactivity. The proverbial aldehyde/metal enolate equilibrium is shifted heavily to the right. In the case of boron, this has to do with its desire to bond to oxygen rather than to carbon. Yudin and his students have found a way to preserve the "metastable" carbon-boron bond containing aldehydes and prevent boron migration to oxygen. Akin to their amphoteric aziridine aldehydes, the alpha-boryl aldehydes are bench-stable solid materials. A fateful triangle of bifunctional reactivity accessible using the reagents developed by the Yudin lab is shown below.

The "fateful triangle" of polyfunctional reactivity



Current Students and Researchers

Graduate Students
Benjamin Chung
Ben Rotstein
Serge Zaretsky
Jeff St. Denis
Igor Dubovyk
Chris White
Philip Sohn
Joy Yu
Zhi He
Naila Assem
Sean Liew
Adam Zajdlik

Postdoctoral Fellows
David Soriano del Amo
Jennifer Hickey

Chair Robert Morris presents Ryan Hili with the Chair's Doctoral Medal in 2010

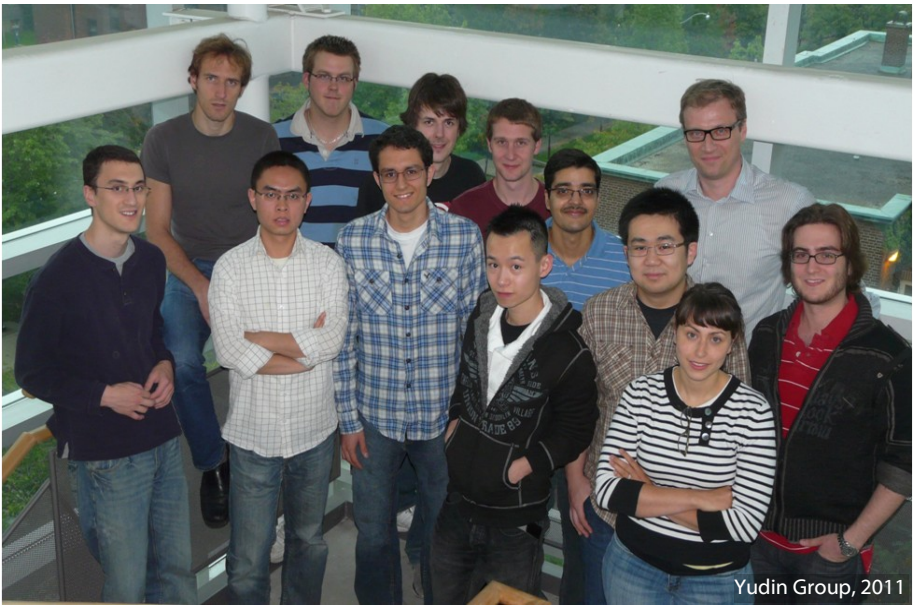
Former Students and Researchers

Graduate Students	Current Position
Tim Lou (2011, MSc)	PhD Student, University of Manitoba
Shannon Decker (2010, MSc)	Chemist at the GreenCentre Canada
Nick Afagh (2010, PhD)	Medical Student, McMaster University
Eric Van Oosten (2009, MSc)	Medical Student, Queen's University
Ryan Hili (2010, PhD)	Postdoctoral Fellow, Harvard University
Brittany Inman (2008, MSc)	Scientist, GlaxoSmithKline
Tim Rasmusson (2008, MSc)	Scientist, Novartis
Xinghan Li (2007, MSc)	Student, Business School
Sharon Yang (2007, MSc)	Student, Law School
Gang Chen (2006, PhD)	Scientist, Siemens
Lily Yu (2006, MSc)	Patent Agent, Ottawa
Iain Watson (2006, PhD)	Scientist, Ontario Institute for Cancer Research (OICR)
Larissa Krasnova (2006, MSc)	Postdoctoral Fellow, Scripps Research Institute
Shadi Dalili (2005, PhD)	Lecturer, DPES, University of Toronto Scarborough
Shahla Yekta (2005, PhD)	Professor, University of Rhode Island
James Martyn (2005, PhD)	Patent Agent, Ottawa
Yu Chen (2004, PhD)	Professor, Queens College
Leslie Fradkin (2002, MSc)	High school Teacher, Earl Haig S.S.
Jennessa Youm (2005, MSc)	High school Teacher, Crestwood Prep.
Christine Picard (2002, MSc)	Postdoctoral Fellow, Texas A&M University
Tung Siu (2004, PhD)	Patent agent in Ottawa

Postdoctoral Fellows	Current position
Dr. David Winternheimer (2011)	Vice President, Sanguine Biosciences
Dr. Vishal Rai (2011)	Professor, Indian Institute of Technology
Dr. Sivaraj Baktharaman (2008)	Research Chemist, OICR
Dr. Patrik Vastila (2007)	Researcher, Stockholm University
Dr. Igor Titaniuk (2002)	Scientist, Russian Academy of Sciences
Dr. France-Aimee Alphonse (2006)	Scientist, GlaxoSmithKline
Dr. Aldo Caiazzo (2002)	Chemist, Shell
Dr. Subramanian Pandiaraju (2002)	Scientist at OICR
Dr. Mikio Sasaki (2003)	Scientist, Sumitomo Chemical
Dr. Evgenii Blyumin (2006)	Scientist, DSM Nutritional Products

Undergraduate Students

2008: Adelle Vandersteen (UofT), Esther Piers (UofT),
2006: Helen Gallon (University of Manchester)
2005: Katayune Presland (University of Manchester)
2003: Cindy Yen (UofT), Aftab Khan (UofT)
2002: Laurie Joyce (UofT), Eugene Kwan (UofT), Brian Mariampillai (UofT)

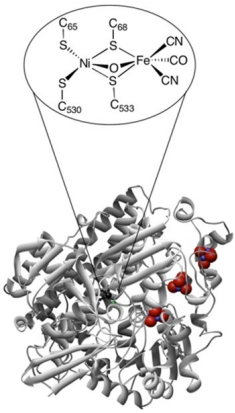


Zamble Research Group

I set up my lab as an independent investigator in the Davenport Building the summer of 2001, so this beautiful space has always been home for my group (and hopefully always will be). The space is ideally suited for our research in biological chemistry, with lots of places for instruments both large and small, as well as a huge cold room. The labs are optimized to enhance interactions within and between the research groups, which fosters a lot of discussions and equipment sharing. It is a pleasure to work in the open, clean designs of the Davenport Building laboratories.

Research Interests

The focus of this research is to understand how nature uses transition metals. The problem is that although many of these elements are essential for life, they also have toxic properties. To be able to safely use transition metals, organisms have developed tightly-regulated systems that maintain metal homeostasis and minimize uncontrolled cellular exposure. The long-term goal is to understand the mechanisms of action of the proteins that handle the metals and ensure that the correct metals are available in the appropriate time and place in the cell. Not only is this rapidly expanding field an exciting and significant area of basic science research, it will provide information vital for medical and environmental applications.



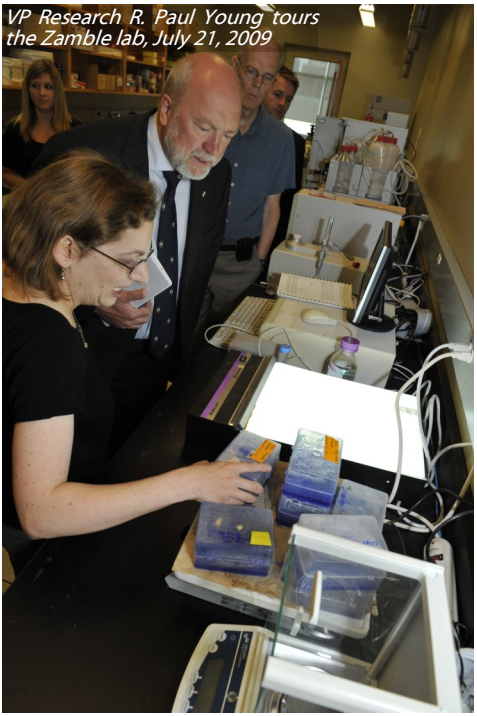
[NiFe] hydrogenase enzyme and active site

For example, nickel is required by many microorganisms, such as the pathogenic bacteria *Helicobacter pylori*, which causes ulcers, gastritis, and gastric cancers. Given the lack of a nutritional requirement for nickel in humans, nickel pathways represent potential targets for new antimicrobial strategies. Our research program is an examination of the chemical properties and biological activities of proteins involved in nickel homeostasis. Over the past few years we identified a new factor in prokaryotic nickel homeostasis, solved several key questions about nickel-dependent metalloregulation, provided new information about hydrogenase biosynthesis, and the developed several metal detection methods with broad applications. We pursue our research goals by using an interdisciplinary approach, and the experiments employ a combination of techniques from biological chemistry, inorganic spectroscopy, molecular biology, and microbiology.

Current Students and Researchers

Trainees

After the first few years my group has remained steady at 4-6 graduate students, a postdoctoral fellow or technician, and several undergraduate students. The latter have gone on to pursue additional training in graduate schools or professional schools. The graduate students who have finished their degrees are now postdoctoral fellows (Oxford, Yale), teaching (Dept. of Human Biology, Toronto) or are working in various industries (Biotech, Financial). Previous PDFs are now working as Research Scientists (Sanofi-Pasteur, Mt. Sinai Hospital).



VP Research R. Paul Young tours the Zamble lab, July 21, 2009

Graduate Students

Irsa Ademi	Colin Douglas
Michael Jones	Sandra Krevisz
Andrew Sydor	Nesrin Vurgun

Postdoctoral Fellows

Thanh Ngu

Zamble Group, 2011

Former Students and Researchers

Graduate Students	**Current Position**
Jessica Flood (2011, MSc)	Lab Technician, Mexico
Kim Chan Chung (2011, PhD)	Postdoctoral Fellow, University Health Network (UHN)
Harini Kaluarachchi(2011, PhD)	Postdoctoral Fellow, California
Fang Cai (2010, MSc)	Scientist, Wisent Technologies
Yanjie Li (2010, PhD)	Postdoctoral Fellow, Yale University
Sheila Wang (2009, PhD)	Postdoctoral Fellow, University of Oxford
Alistair Dias (2009, PhD)	Lecturer, Human Biology, University of Toronto
Stephanie Bloom (2003, MSc)	Scientist, Umedik Inc.
Lihor Abraham (2004, MSc)	Financial Industry
Postdoctoral Fellows	**Current Positions**
Anita Chaudhari (2004)	Senior Scientist, GlaxoSmithKline
Xiaojun Yin (2011)	Research Associate, UHN
Michael Leach (2006)	Research Scientist, Sanofi-Pasteur
Anelia Atanassova (2004)	Consultant, Investors Group
Research Associate	**Current Position**
Dengbo Ma (2006)	Research Associate, UofT


Zamble Group, 2009

Undergraduate Students

2011: Michael Jones (UofT), Irsa Ademi (UofT), Sonia Sugumar (UofT), Rishikesh Ariyakumaran (UofT), Matthew Lumba (UofT)

2010: Judith Siebel (German Exchange Student, Mainz), Jennifer Ladrillo (UofT), Wasim Kagzi (UofT), Joy Yu (UofT)

2009: Jenny Liu (McGill), Sandra Krecisz (UWO), Steven Loo-Yong-Kee (Waterloo)

2008: Maria-Elena Bernal (UofT), Sheraz Khan (UofT), Pengpeng Cao (UofT),

2007: Lema Yousif (UofT), Fiona Chipouline (UofT), Man Ying Ho (UofT), Aditya Natarajan (UofT)

2006: Jessica Diciccio (UofT). Cory Mulvihill (UofT), Li Cao (UofT)

2005: Shaifali Sandal (UofT) Antonia DeJong (UofT)

2004: Collin Thang Nguyen (UofT), Linda Haowei Sun (UofT)

2003: Michael Goldberg (UofT)

2002: Alexander Williams (UofT),

2001: Obinna Onuora (UofT)

Zamble Group, 2004

A. D. Allen Chemistry Library

The A.D. Allen Chemistry Library was relocated in 2001 to the 4th floor of the Davenport Building a year after the construction was completed. The library is unique in that it spans both the old and the new, wrapping itself around the 3rd floor atrium which has become a hub for departmental activities.

The old library was also situated on the 4th floor of the Lash Miller Building. The library was cramped, heavily-used and overstuffed with journals and books. I know this firsthand as I wrote my M.Sc. thesis in that original library many, many years ago!

I joined the department at the most opportune time. Lucky me—the construction for the new wing was just beginning which allowed me to participate in the functional design of the new library. Working together with the architects, we created a very modern, effective and welcoming facility.

Students and faculty love our library! The larger space has allowed us over the years to expand our book and journal content without losing study space. We have modernized further to accommodate wireless access to the U of T network.

We are now at a new crossroads only ten years down the road – with most of our journal content online, we are moving many print volumes to the University of Toronto Library's off-site storage facility at Downsview. This still permits retrieval within 24 hours but clears even more valuable space in the library for study carrels, tables and computer use. The students will love the extra space and the library will become even more of a study centre for the 2nd to 4th year chemistry students. Graduate students and faculty still use it after hours as a very quiet, peaceful place to write papers and theses or do literature research.

Patricia Meindl,
Chemistry Librarian