



Mudd In Your Eye

Newsletter of the Department of Chemistry, Lehigh University

Number 41 September 2012

"Great importance is given to chemistry as an elementary branch of learning." — Lehigh Register 1866

A Radical Approach to Greener Chemistry

An international team of chemists from Lehigh University and Germany has developed a new method for jump-starting common industrial chemical reactions with a single-electron catalyst that regenerates itself during the reaction. Described as "a slow electron waltz" in the German journal *Angewandte Chemie*, the potentially novel approach to catalytic reactions employs oxidative additions and reductive eliminations in single electron steps. The process passes a single electron borrowed from titanium (III) through a complex chemical dance that turns substituted benzenes containing pendant epoxides into indoles that are precursors to numerous pharmaceutically important compounds.

The new method avoids the waste of using a "sacrificial" additional metal to cause the reaction, like manganese or zinc, toxic metals that are commonly consumed in reactions employed in the fine chemical, polymer and pharmaceutical industries. Instead, it employs less than one percent of the titanium catalyst per each mole of primary reactants. Traditional industrial reactions of this type can require just as much catalyst as they do raw feeder materials, making the reactions inefficient and expensive.

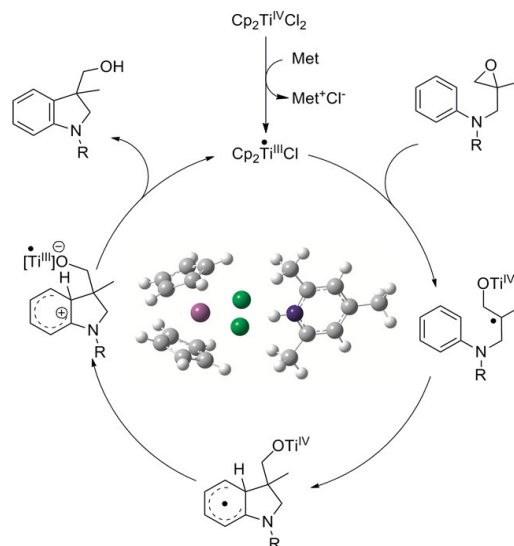
"We like to think of this research as a step towards a greener version of free-radical chemistry", said **Robert Flowers**, chair of Lehigh's department of chemistry and an author of the paper *Catalytic, Atom-Economical Radical Arylation of Epoxides*. "Even if you can increase the efficiency of a large-scale industrial reaction by one percent it could save millions of dollars. Plus, any process where you are creating less waste is very important and that is the ultimate goal." Industrial-scale chemistry is all about synthesizing complex compounds from molecularly simply, raw materials. The fewer steps to turn "feed stocks," derived from petroleum, into complex products or fine chemicals, the more efficient, cheaper and green the industry can be.

Flowers and his colleagues exploited the innate capability of titanocene, in which titanium undergoes reversible electron-transfer reactions. "Once we generate the intermediate free radical, it reduces the titanium and regenerates it," said Flowers. "So you get electron transfer to the substrate, an intra-molecular reaction and then electron transfer back to the metal." The research team used infrared spectroscopy to observe the reduction of titanium (IV) to (III), watched the

catalyst levels decrease as the starting material converted to a final product, then monitored the titanium catalyst rise back to its initial concentration. Placing more starting material into the reaction—and no further catalyst—continued the reaction.

The development of efficient catalytic reactions is one of the central goals of synthetic chemistry and arguably the most important for the invention of novel, sustainable processes. Radical based transformations are among the most attractive methods for use in catalytic cycles. Flowers' research team and collaborations revolve around developing new synthetic reactions and exploring the molecular mechanisms behind them. They are currently examining intermolecular reactions and additions initiated through single electron reduction of other functional groups including ketones, aldehydes, and esters.

The research was funded by the National Science Foundation and the Deutsche Forschungsgemeinschaft. The study was conducted by Professor Andreas Gansäuer, Maïke Behlendorf, Daniel von Laufenberg, André Fleckhaus and Christian Kube of the Universität Bonn; and Flowers and Dhandapani V. Sadasivam of the Department of Chemistry at Lehigh University.



Thanks to Jordan Reese for the generous use of this article. This article, posted April 26 in the LU News Center, is stored in the LU Archives.



On the 200th anniversary of the death of Joseph Priestley, Jim delivers a memorial lecture at the Priestley grave site in Northumberland, PA, 2004.

James J. Bohning

This departmental alumni newsletter has lost its editor and name-giver in the passing of James J. Bohning, visiting scientist at Lehigh since 1998 on 2 September 2011. Jim spent his retirement years at Lehigh fulfilling many roles as student mentor, teacher of science writing, adviser on grad student seminars, and editor of our newsletter. A remembrance obituary by Jim's friend, Ned Heindel follows.

Jim was first of all a professor who in 1959, fresh from his MS at NYU, began an academic career as an instructor at Wilkes College (now University, Wilkes-Barre, PA). He took leave from 1962 to 1964 to complete his doctorate in physical chemistry at Northeastern (PhD 1965) and returned to Wilkes as Assistant Professor. Jim rose through the ranks, served for twenty years as chair, and retired as professor emeritus in 1990. He published several papers on the photolysis of heterocyclics. Jim's interest in history had been whetted, when in April 1974, he chaired the 9th Middle Atlantic Regional Meeting (MARM) in Wilkes-Barre. Jim focused that MARM on history, especially on the Centennial of Oxygen, which in 1874 had gathered America's chemists to Priestley's home in nearby Northumberland. That meeting was a contributing factor in the subsequent organization of the ACS.

Jim served as Chair (1971) and long-time archivist for the Susquehanna Valley ACS Section and became an active member of the History of Chemistry Division (HIST), which he also chaired (1985). He became the division's historian from 1988 to 2011 and its archivist from 1988 to 2009. While still a professor at Wilkes, Jim had begun working as a part-time oral historian at the Beckman Center for the History of Chemistry (now the Chemical Heritage Foundation or CHF).

After retirement from Wilkes, Jim joined CHF as Director of Oral History, and he departed for a position as staff writer for ACS. His retirement from ACS brought him to Lehigh as a Visiting Research Scientist.

At Lehigh he conducted his most extensive research in the history of chemistry and continued to do oral histories for CHF, for the Dow Foundation, for Lehigh University, and for the Northampton County Historical and Genealogical Society. Jim prepared papers on his wide interests in chemical history, on the ACS and its founders and presidents, on historic landmarks, on international chemistry organizations, on coal, on Joseph Priestley, and on the winners of the Dexter-Edelstein awards. For several semesters Jim taught a Lehigh course on scientific writing, and he served as adviser to a number of graduate students preparing their PowerPoints for department seminars. His red pencil suggestions for improvement of their seminar documents rescued many a student from the dreaded C.

It was typical of Jim's dogged search for documented details that enriched his writing. Accuracy, specifics, hitherto unknown tidbits, and comprehensive coverage marked each paper, seminar or meeting presentation on which he worked. Jim had won the HIST Division's Outstanding Paper Award in 1989, and he created (and disseminated) a popular tutorial on how to conduct oral history interviews which stressed his philosophy of attention to detail.

Blending his long-standing interests in steam railroads, anthracite mining, and the 19th century industrial revolution, Jim commenced a history of the Coxe family—coal tycoons and philanthropists of Drifton PA. He had completed the interviews and the research and authored two of the chapters. One of these he published as a free-standing article, "Angel of the Anthracite: The Philanthropic Legacy of Sophia Georgina Coxe" (*Canal History and Technology Proceedings*, Vol. XXIV, 2005) and another was read as a paper before a reunion of the Coxe family. Alas, the complete Coxe story will never be finished.

Through 2010, illness slowed Jim's pace, although he continued to edit the newsletters he had founded: *Boltonia* (Bolton Society of CHF), *Mudd In Your Eye* (Lehigh University Chemistry Department), and *Metzger Times* (a family genealogy). He laid out one last symposium on *Edgar Fahs Smith, Book Collector and Scholar* for the Fall 2012 ACS National Meeting, set for August 19, 2012 in Philadelphia. The History of Chemistry Division has dedicated Jim's last symposium in his memory and a scientist-history colleague, Mary-Ellen Bowden, will give a biography on Jim as part of the program.

Jim's health had been declining and several brief hospital stays became longer as he received more extensive treatment. Jim was truly one of a kind. He worked hard at his craft, and in so doing he built a network of friends, colleagues, and collaborators who will never forget this soft-spoken, kindly Renaissance man of Chemistry. Through his contributory service and caring camaraderie Jim inspired many other chemists to develop their own interests in the history of chemistry. Wilkes, the Susquehanna Valley Section, HIST, CHF, ACS, and Lehigh are better places for his having passed their way.

ALUMNI NEWS

In August of 2011 **Jeremy Webber** (MS 2004) joined Medtronic as Principal Chemist - CMC Project Leader where he'll be working to develop drug/device combination products within the Neuromodulation business unit.

Steven L. Richheimer (BS 1968, PhD Stanford 1975) has recently retired and moved to Steamboat Springs, Colorado. In July he published his first book: *The Unity Principle, The Link Between Science and Spirituality*. His book explores the reasons why modern scientific discoveries validate the spiritual concept of holism or (as he calls it) the Unity Principle. The book is available from Amazon or Barnes and Noble.

Michelle DeCrosta (PhD 1986) asks that we amend her job title listed in the August 2011 newsletter to "Senior Director, Analytical and Technical Support". She's held that position for the past 4.5 yrs.

After 17 years as Executive Vice President with Particle Sciences (Bethlehem), **David Fairhurst** has moved as Executive Vice President to Xigo Nanotools in Aiken, SC. David received a PhD in Physical Chemistry from Liverpool John Moores University (1968) and taught as a Visiting Research Associate Professor (1968-1970) in Lehigh's Center for Surface and Coatings Research. David recently published "A Novel Spray-Drying Technology to Improve the Bioavailability of Class II Molecules," in *Drug Development and Delivery*, Vol. 12 (1), pp. 26-31.

Ralph A. Rivero (BS 1982, PhD U Penn 1987), Director of Medicinal Chemistry at GlaxoSmithKline, Collegeville PA, was interviewed in a Chem & Eng News article (April 16, 2012, p. 44) about Glaxo's promising anti-tumor drug GSK2636771. Ralph who has been with GSK for 14 years, directs the company's oncology drug development program. He was formerly a Team Leader at J&J and before that a Research Fellow at Merck.

Bruce Schaeffer (BS 1968), formerly Research Chemist at GSK, has taken a position as Business Analyst at Yoh Scientific.

Bruce Sachais, MD (BA 1988) has been appointed Chair of the Institutional Review Board #1 at the University of Pennsylvania School of Medicine. Bruce is also an Associate Professor of Pathology and Laboratory Medicine at Penn.

George Marchesini (MS 1989) was named Associate Director of Regulatory Affairs - Advertising and Promotion, Oncology Business Unit at Novartis Pharmaceuticals

Esther Pesciotta Miller (BS 2005, PhD 2011) is a Bio-Analytical postdoctoral chemist at The Children's Hospital of Philadelphia.

John J. Spaltro (PhD 1985) has been hired as Senior Director, Global Regulatory Strategy, at Conance.

Albert Clark (BS 1942, MS 1947) is living happily in a retirement village in Redlands, California. After graduation in 1942 he was a bomb disposal expert during WWII. During 3 years at Oak Ridge, Tennessee, he received a patent on a new method of separating Uranium isotopes. In 1951 he received a patent on a method of separating Lithium isotopes. He retired after 29 years from General Electric in 1981. He taught science for a number of years in elementary school.

Kimberly Freedman Kellow (MS 1999) was inducted into the Roger S. Penske/Lehigh Athletics Hall of Fame in April 2012. Kim had arguably one of the greatest careers of any women's volleyball player in Lehigh history, setting many school and Patriot League records. Kim excelled off the court as well, graduating with a 3.59 GPA which allowed her to pursue Chemistry as a Presidential Scholar. She was hoping to pursue her dream as a perfumer and is now just one of only 500 perfumers in the entire world. She is now working in New Jersey for Takasago International, a Japanese fragrance corporation.

Stephanie C. Hamel (MS 1988, Joint PhD in Exposure Assessment from the UNDMJ Robert Wood Johnson Medical School and Rutgers, the State University of New Jersey) recently published her first book, *"Gas Drilling and the Fracking of a Marriage,"* a memoir about an environmental scientist who is tempted to betray her ideals by the promise of extravagant royalties. With a PhD in environmental health sciences, she could not ignore the possible ill effects of gas drilling and fracturing ("fracking") of the shale beneath the surface. Her decision was complicated further by Pennsylvania's Law of Capture, which would allow energy companies to collect gas from her property via the neighbor's well without paying her a dime. In the words of a reviewer, this book is a poetic, heartfelt, honest yet light-hearted memoir which will strike a vein for anyone who has played weekend farmer or agonized over their role as steward to the earth's resources. How much sacrifice is required of us? What if our sacrifice means little in the general scheme of things? *Dr. Hamel may not have the answers, but she poses the right questions.*

Keith Kardos (PhD 1994) was appointed Chief Science Officer and VP for R&D at CD Diagnostics, Wynnewood, PA. CD Diagnostics <www.cddiagnostics.com> is developing diagnostic assays for diseases arising in the synovial fluid of joints. Their first immunoassay detects infections in joint fluid. Keith was formerly Vice-President for OraSure Diagnostics in Bethlehem, PA.

Lehigh chemistry alumni interested in the history of their Department will enjoy a newly digitized item "History of the Department of Chemistry and Chemical Engineering" by Robert Billinger. The late Professor Billinger wrote our Department's story in 1941 for the 75th Anniversary of the University. Full text access to this fascinating history has been posted by Lehigh's Special Collections at http://library.lehigh.edu/collections/special_collections/lehigh_university_history/history_resources/

NEW ALUMNI—CLASS OF 2011-12

PhD Chemistry: Brian M. Casey and Sherri C. Young.

MS Chemistry: Jaclyn L. Allwein, Michelle A. Baron, Heather D. Callaghan, Jennifer Chung, Thomas M. Ensor IV, Jie Fu, Joseph G. Garafolo, Anthony T. Ginetti, Jason T. Graves, Gabrielle L. Haddad, Jane C. Holman, Ashley B. Homland, Alex D. Hunter, Ricardo A. Jara, Christopher T. John, Michael J. Kelly, Fadi A. Khatib, Tara M. Kiss, Jessica L. Kogan, Berenika A. Kokoszka, Michael J. Kosalko, Lillian D. Kull, Aleksandr Linetskiy, John W. Loughney, Daniel J. Neary, Niki R. Patel, Michael S. Rischmiller, Stuart A. Ritchie, Anastasija Shytuhina, Stephon C. Smith, Reshma P. Thakore, Eric R. Theiner, Adrienne J. Thornburg, and Brenton D. Utech.

BS Chemistry: Suzanne M. Adam, Maggie R. Gordon, Cody R. Hanna, Michelle S. Hofman and Bradley D. Wooler.

BS Pharmaceutical Chemistry: Arika Aggarwal, Richard T. Knight, Leah J. Kulp, Tony D. Thompson and Matthew S. Yosua.

BS Biochemistry: Jennifer D. Cohen, Jennifer M. Colquhoun, Joshua M. Gajsiewicz, Meredith P. Harman, Tiauna Howard, Jason B. Katz, Ryan A. Kaye, Matthew L. Mudalel, Patrick C. Osborn, Cassandra B. Tuttmann, Christopher K. Umbach and Adrienne S. Viola.

STUDENT AWARDS — 2012

Matthew S. Yosua—American Chemical Society Award Presented to the outstanding senior major in chemistry.

Jennifer M. Colquhoun—American Institute of Chemists Award. Presented to an outstanding senior majoring in chemistry or biochemistry.

Suzanne M. Adam—American Chemical Society Inorganic Chemistry Award for an outstanding senior. Suzanne also received the Merck Index Award awarded to a senior chemistry major who has been active in student affairs.

Jennifer M. Colquhoun—Alpha A. Diefenderfer/American Chemical Society Analytical Award presented to the highest-ranking junior in analytical chemistry sponsored by the ACS Division of Analytical Chemistry.

Tony D. Thompson—Merck Index Award presented to a senior who is active in student society affairs and has the promise of a successful career in chemistry.

Daniel A. Nissley—Alpha A. Diefenderfer/ACS Analytical Award presented to the highest-ranking junior in analytical chemistry.

Michelle S. Hofman—Harry M. Ullmann Chemistry Prize presented to the highest-ranking senior in chemistry.

Adrienne S. Viola—William H. Chandler Senior Prize, established in 1920 by Mrs. Chandler, presented to the highest-ranking senior in the chemistry department.

Jennifer B. Shah—William H. Chandler Junior Prize presented to the highest-ranking chemistry junior.

Ciera M. Rosario—William H. Chandler Sophomore Prize presented to the highest-ranking chemistry sophomore.

Daniel A. Nissley—Hypercube, Inc. Scholar Award presented to a chemistry major who has shown outstanding promise in theoretical chemistry and molecular modeling.

Chemistry Honors Students for 2012

Joshua Gajsiewicz presented his Honors thesis on the topic of “DNA Spacing Techniques for Use in Single Molecule Manipulation Experiments.” His research adviser was Dmitri Vezenov.

Meredith Harman presented her Honors thesis on “Structure Activity Relationship of NSAID Anticholinergic Prodrugs.” Ned Heindel was her adviser.

Jason Katz performed his Honors research and thesis on “A Review of the Elisa Protocol Implemented in a TB Serological Diagnostic Assay.” Sam Niedbala was his research adviser.

Ryan Kaye presented his Honors thesis on the topic of “Deracemization of Alpha-Heterosubstituted Aldehydes.” Bob Flowers was his research adviser.

GRADUATE STUDENT AWARDS

Congratulations to the following chemistry graduate students who were awarded fellowships for 2012-2013:

Kimberly Choquette (Flowers group) has been awarded the prestigious Roy R. Hornor Research Fellowship in Metallurgy and Inorganic Chemistry. **Godfred Fianu** has been awarded a prestigious University Graduate Fellowship.

Panchao Yin (Liu group), **Cong Liu** (Landskron group) and **Kyle Root** (Glover group) have been awarded departmental fellowships.

SEEMON H. PINES OBITUARY



Seemon H. Pines (BS 1948) died in May 2012 at age 86. He was a retired Vice President for Process Research of Merck. Seemon enrolled at Lehigh in 1943 but service in the US Navy in WW2 interrupted his education; he returned as a full-time student in 1946. He graduated in 1948 with a concentration in industrial chemistry at the time when Lehigh's Chemical Engineering program was incorporated into the Chemistry Department. (Chemical Engineering became a separate department in 1951). Seemon went on to do a doctorate in organic chemistry under another Lehigh alumnus, Nelson Leonard, at the University of Illinois. Upon completion of his PhD in 1951 he joined Merck.

Seemon was the holder of 44 U.S. patents, numerous foreign patents, and was the author of 33 publications. In 1987 Merck honored him for his role in developing its broad spectrum injectable antibiotic, Primaxin. He had a major impact on the modern pharmaceutical industry as an executive leader in the worldwide initiative to develop new pharmaceuticals as single enantiomers rather than as the standard racemic mixtures (1:1) of the two enantiomers. The significance of the single enantiomer approach is that the beneficial activity of a drug usually resides in only one enantiomer and not the other enantiomer. The other enantiomer may be inactive or, more significantly, produce unwanted side-effects. The development of the single enantiomer approach required the development of new (chiral) technologies to produce the single enantiomers. Under Seemon's scientific leadership, Merck became a world-wide leader in the development and implementation of technologies.

In retirement Seemon worked in drug synthesis and process optimization with a number of small start-up companies. One of these start-up companies was BioProX, which was located in the Ben Franklin Incubator on the Lehigh campus.

THOMAS B. LLOYD OBITUARY



Thomas B. Lloyd, who recently died at age 90, was a Visiting Research Scientist in the Department from 1983 to 2004. During that time Tom worked in the Fowkes Institute of Surface Chemistry carrying out research in surface and material chemistry as well as in environmental science. He mentored many graduate students and published extensively on wetting phenomena and contact angles. He received his BS in chemistry from Washington & Jefferson College, served in the U.S. Navy (CBs) during World War II, and earned his MS and PhD degrees from Western Reserve University in physical chemistry after the War.

Doctorate in hand, Tom came to the Lehigh Valley to join the chemistry faculty at Muhlenberg College and subsequently joined the R&D staff of the New Jersey Zinc Company in Palmerton from which he retired as chief technology officer. In his 21 years at Lehigh, Tom organized and helped finance the Fowkes Institute of Surface Chemistry Scholarship Program. He was pleased to bestow that award on countless bright young graduate students.

Tom will be remembered as a stimulating research colleague, mentor and friend to many Lehigh chemists.

"Nothing in the world can take the place of persistence. Talent will not; nothing is more common than unsuccessful individuals with talent. Genius will not; unrewarded genius is almost a proverb. Education will not; the world is full of educated derelicts. Persistence and determination alone are omnipotent."

—Calvin Coolidge

CHAIR'S MESSAGE

It is hard to believe that summer has come and gone and another academic year has begun. The Department was quite busy and a number of important changes have occurred. Tianbo Liu and Greg Ferguson were promoted to Full Professor. In addition to this great news, we were just notified that Kai Landskron and Dmitri Vezenov were recommended for tenure and promotion to associate professor by the Provost and the process will be finalized at the fall meeting of the board of trustees. We are very proud of our colleagues' accomplishments and greatly appreciate their contributions to teaching and research. We also welcome Professor David Vicic. David is joining the department as a senior colleague and comes to us from the University of Hawaii. David is a highly regarded organometallic chemist with research interests in organofluorine chemistry, metal-catalysis, the development of new reaction methods, and the development of environmentally friendly synthetic methods. The main thrust of David's research program for which he is best known is in the development of new methods in the introduction of fluorine into organic compounds. David has published well over 40 papers in important professional top-tier journals including the *Journal of the American Chemical Society*, *Organometallics*, and the *Journal of Fluorine Chemistry*. His work is funded by a highly competitive grant from the DOE and an International Collaboration Grant from the NSF. His seminal work on the development of a cross-coupling catalyst featured in the *Journal of the American Chemical Society* in 2006 has been cited 104 times since publication and averages well over 15 citations a year. His presence will significantly help us achieve our goal of becoming a top-tier chemistry program.

In other faculty and staff news, congratulations are in order to Dr. Andy Ho, Manager of general chemistry labs and Keith Schray, professor of chemistry. Andy received the Alfred Nobel Robinson Staff Award for his creative work in laboratory design and development of new labs. Keith received the R. and Mary F. Lindback Foundation Teaching Award in recognition of being one of the finest teachers at Lehigh. Keith has had a profound impact on the education of students at all levels and his dedication to students is widely recognized.

A number of other major changes are taking place as well. During the fall semester, we are beginning the renovation of teaching labs on the second floor. By the end of the fall, we will have a modern laboratory for advanced chemistry and biochemistry labs. We are very pleased with the continued investment in the department and anticipate sustained growth of our program and facilities over the next several years. Additionally, as a continuation of our plan for faculty expansion, the department is conducting a search for a colleague in theoretical chemistry or computational chemistry.

These are very exciting times for the Department and I thank all of you for your letters containing updates and news. Your continued support of the department is greatly appreciated. Please don't hesitate to stop by if you are in the area and want to see the big changes occurring in the department.

FACULTY NEWS

Greg Ferguson presented an invited talk at the National Meeting of the American Chemical Society, Anaheim, CA in March 2011, "Regioselective Placement of Ligands on Surfaces: Studies at the Nexus of Surface Chemistry, Solution Chemistry, and Electrochemistry" and co-authored 5 journal articles.

Natalie Foster co-authored the 3rd edition of *Chemistry: The Science in Context* and co-authored a journal article about women faculty which was published in the *Journal of Chemical Education*.

Jebrell Glover presented 2 invited lectures related to Caveolin-1 at Worcester Polytechnic Institute in March 2011 and another at North Carolina State University in October 2011.

Ned Heindel presented 10 invited lectures across the country and co-authored 4 abstracts and presented 2 of them at professional meetings. In addition he co-authored three journal articles.

Kai Landskron was a session chair of the International Conference Nanoporous Materials VI and presented invited lectures at Rutgers and Batelle. He co-authored three journal articles. Again this year Kai received coverage on national news with his finding of a new porous material that could aid in carbon capture and potentially reduce the cost of capturing carbon dioxide, a greenhouse gas emitted by power plants.

Tianbo Liu presented two invited lectures (Drexel and U. of Akron, Polymer Sciences Department) and was corresponding author of 7 journal articles. Tianbo has had 7 undergraduates and high school students working with him this year.

David Moore was a session chair of the 2011 European Conference on Applications of Surface and Interfacial Analysis. David was recognized at the College of Arts and Sciences Dialog Across the Disciplines dinner in 2011 for his research accomplishments in two different areas with relevance to alternative energy: Nanoparticle catalysis (NSF CAREER Award) and Carbon Capture (ARPA-E Research Grant). He presented talks on his research about using cryogenic spectroscopy to understand nanocatalysis at Florida State University, Tohoku University in Sendai, Japan, and Hong Kong University. He published an article about the same research in the *Journal of Physical Chemistry A*.

Marcos Pires authored two journal articles and also co-developed the creation of the tissue culture room in the Chemistry Department along with Damien Thévenin. This facility houses the instruments necessary to grow and analyze live mammalian cells. The facility will be open to all Chemistry faculty and their students.

(FACULTY NEWS continued on page 7)

FACULTY NEWS (cont'd from page 6)

Marcos Pires gave an invited talk at Gettysburg College this spring and was a recipient of the Class of '68 Fellowship. He and **Damien Thévenin** were co-recipients of the Faculty Innovation Grant from Lehigh for a proposal titled, "Selective Delivery of Anti-cancer Agents using Novel Tumor-Targeting Vehicles."

Steven Regen presented three invited lectures, one at Marquette University in fall of 2011 and in spring 2012 at both the University of Naples, Italy and Oklahoma State University. Steve was principal investigator for 4 journal articles.

Jim Roberts co-authored a JACS article with Tianbo Liu involving NMR experiments.

Dmitri Vezenov presented six invited talks on an innovative way of sequencing genomes. He lectured at Florida State, University of Central Florida, Tulane, Tufts, UNC, Chapel Hill, and University of Wisconsin, Madison. In addition Dmitri co-authored and/or contributed to 5 journal articles.

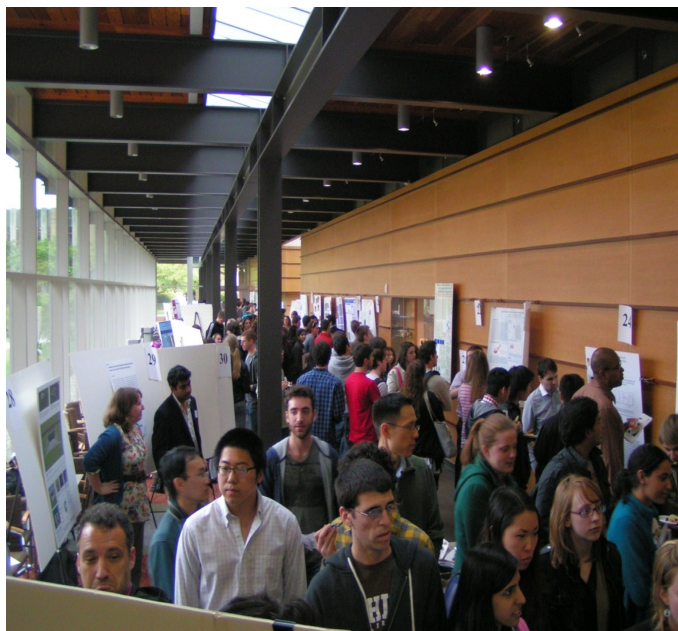
Robert Flowers presented an invited talk on "Follow the Thread: Unraveling the Mechanism of Single-Electron Oxidation in Important Synthetic Reactions" at the 5th Pacific Symposium on Radical Chemistry in Shirahama, Japan in September 2011. He co-authored five journal articles and two book chapters and presented a series of invited lectures in April 2011 at UCLA, UCSB, UCSC and UC Davis as well as a lecture at U Penn on November 14. In May 2012, he gave several invited lectures in Australia at the following Universities: Australian National University, University of Tasmania, University of Melbourne, and University of Sydney.

Damien Thévenin presented an invited talk at Messiah College in April. Please see Marcos Pires' section above concerning collaboration information of these two new faculty members.

NEW FACE ON THE DEPARTMENT STAFF

Aliana Lungu was appointed manager of the Organic Chemistry Laboratories in August 2011. She teaches the two organic chemistry labs and, under the guidance of Keith Schray, has made major improvements.

Aliana received both her BS/MS in Chemical Engineering from the University of Timisoara, Romania.



STEPS concourse with its sea of posters— Undergraduate Research Symposium - April 26

"How can ultrasound help nanoparticles target cancer cells?"

"How diverse are the boards of directors of commercial banks that do mergers and acquisitions?"

"How did Islam relate to social movement groups during last year's "Arab Spring?"

These and 36 other topics were on display in April when students turned the STEPS concourse into a sea of posters (see photo above) at the annual Undergraduate Research Symposium, of 2012. It was organized for the ninth time by members of Alpha Chi Sigma, the Professional Chemistry Fraternity. The Lehigh chapter initiated the event again this year. "It was our best year yet," said Keith Schray, professor of chemistry and adviser to Alpha Chi Sigma. "A lot of people participated and attendance was up."

Forty research projects were presented and hundreds of students, faculty and staff attended in the new location, the concourse of the STEPS building, which also houses the general chemistry and organic labs.

The following undergraduate students from the Chemistry Department presented posters at the symposium:

Michael Kelly presented a poster on "Analyzing Omp X in Phospholipid Bicelles" with **Prof. Jebrell Glover** serving as his adviser.

Erin Wildeman presented a poster on "Epigenetic Modifications by RBP as a Potential Cancer Therapy" with **Prof. Marcos Pires** serving as her adviser.

Lindsey Yap presented a poster of "Ni-IDA modified Peptide for Dimerization of Proteins via His-Tab" with **Prof. Marcos Pires** also serving as her adviser.



Robert Rapp (right) and his former Lehigh dissertation adviser, Irving J. Borowitz, enjoy a reunion at the 2001 ACS National Meeting in San Diego, 33 years after they parted company at Lehigh

SPOTLIGHT ON ALUMNI

Robert D. Rapp

It's just after 8 am on a Monday or Tuesday morning and regular as clockwork Robert D. Rapp (LU PhD 1967) has arrived at his 7th floor Mudd Laboratory prepared to work. Since rejoining the department in 1992 as a visiting scientist, Bob has the longest association with the department of any alumnus volunteer. Bob was 34, employed as a clinical chemist when he first came to Lehigh in pursuit of a PhD in organic chemistry. Not only in age but also in experience, Bob was far from the typical Lehigh chemistry grad student. He'd served as a hospital corpsman in the US Navy (1949-1955), studied chemistry at Tufts under a Naval Midshipman scholarship (1951-55), worked as a paint and polymer chemist at Alkyd Resins and Polymer Corporation (1955-57), and was engaged in both routine clinical analyses and clinical research at Reading Hospital (1957-64).

Liver enzyme levels, protein bound iodine numbers, blood sugars, glucose tolerance tests, and BUNs were just a few of the countless assays Bob learned to run as individual procedures years before the introduction of the auto-analyzers, ACAs, and microtiter formatted Elis as made clinical chemistry a highly instrumented field. Thanks to a supervising pathologist who encouraged research, Bob published three articles on new analytical methods for serum amino acids and for lactic dehydrogenase. He caught the fever for doing chemistry research.

At Lehigh Bob's interests in the biomedical aspects of chemistry found fulfillment in his doctoral research in antibiotics under Professor Irving J. Borowitz. Borowitz taught general and advanced organic chemistry at Lehigh from 1959 to 1965. Borowitz, a native New Yorker with strong professional and social ties to *the Big Apple*, moved

from Lehigh to Yeshiva University and took several of his Lehigh grad students with him. Bob, however, was well on the way to completing his PhD and in addition had ties to the greater Reading area with a home, wife, and twin daughters (born 1955), so relocation to NYC wasn't feasible. Professor Thomas Young (faculty 1954-1991) took over as Bob's day-to-day mentor while Borowitz remained Bob's dissertation supervisor and signator of the final document. Since Borowitz's grant funding moved with him to Yeshiva, Lehigh's chemistry chairman, Edward D. Amstutz (faculty 1938-1972) found Bob salary support via an instructorship in the Department of Chemistry at Lafayette College (1966-67).

While a Lehigh grad student, Bob's dissertation research dealt with natural products chemistry – a *de nova* synthesis of ketononanolides critical intermediates needed in the preparation of macrolide antibiotics. Four publications in *Tetrahedron* and in the *Journal of Organic Chemistry* resulted from Bob's doctoral dissertation.

In 1967 with his diploma in hand, the teaching experience Bob gained as an instructor at Lafayette College made him the successful contender for a tenure track Assistant Professorship at Albright College in Reading. There he rose through the ranks to full professor. While at Albright Bob steadily encouraged the best and brightest of Albright students to take their own graduate degrees at his alma mater on ol'South Mountain. The annual fall trip of carloads of Albright seniors visiting LU's chemistry department for the day was something Bob faithfully arranged every year of his teaching career. Several of Lehigh's most distinguished graduate chemistry alumni came to us from Albright where they'd been encouraged and/or mentored by Bob. These alumni include Alan Oyler (PhD 1973, research staff – University of Minnesota), Dennis Hess (PhD 1973, faculty -- Georgia Tech), Nancy Dodrer Arabinick (PhD 1990, research chemist – FMC and Liposome Corp), Jessica Zuber Pfennig (MS 1990, regulatory affairs -- Merck), and Sherri Young (PhD 2012, faculty -- Muhlenberg College).

When he retired from Albright, Bob came back to Lehigh as a Visiting Scientist to work with Ned Heindel's medicinal chemistry group. In 2012 Bob completed 20 years as a volunteer on the Lehigh research staff where he has mentored dozens of students, served on several dissertation committees, conducted personal research in heterocyclic medicinal agents, and co-authored publications and patents. Bob, who was born in 1930 to a Pennsylvania Dutch family living near Reading, grew up immersed in the local German dialect amidst Deutsch farmers, craftsmen, and tradesmen. He attended many a Groundhog Day dinner, chowed down on countless servings of hog maw, Schnitz und Knepp, sauerkraut balls, fastnachts, and shoe fly pie all washed down with steins of Old Reading, and even performed regularly as a Schuhplattler in a folk-dance group dressed in his own Lederhosen and alpine hat. Bob recalls that a couple liters of Old Reading greatly improved his dancing performance.

(continued on page 9)

FACULTY/STAFF AWARDS



Pictured above (L to R): Andy Ho, Bob Flowers and Keith Schray

Congratulations to department members Robert Flowers, Andy Ho and Keith Schray who won University Awards this year:

Robert Flowers won the **Eleanor and Joseph F. Libsch Research Award** for his extensive publications in prestige journals of chemistry.

Andy Ho, manager of the general chemistry labs, received the **Alfred Nobel Robinson Staff Award**. He was cited for his very high standard for the students and his creative work with laboratory design and his willingness to suggest new experiments and test drive them.

Keith Schray received the **Christian and Mary Lindback Foundation Award For Distinguished Teaching**. He was cited as one of the finest teachers at Lehigh who has had a profound impact on the education of students at all levels.

Rapp (cont'd from page 8)

In his mentorship of Lehigh students Bob brings a blend of the classical and the modern. He's a talented spectroscopist who uses and teaches all contemporary instrumentation, state-of-the-art metal-catalyzed reactions, and articles from the current literature. With a bench technique reminiscent of the Swiss-German microchemists of the 19th century, Bob frequently runs his reactions in miniaturized glassware on 25 mg quantities, evaporates the solvent from the NMR tube, and obtains his combustion and/or mass spec conformational analyses on the recovered crystals. From Bob the Lehigh students learn the art of experimental organic chemistry and when graduates return to the Department, a reunion with Bob is always part of their visit. From student to faculty friend to visiting scientist, Bob Rapp has been a productive and congenial part of the Lehigh Chemistry Department for 48 years.

An Alumnus Remembers

In November the Department was visited by alumnus Eliot Gordon and his granddaughter. Eliot did his MS with the late Professor Judson Smull (1882-1967). He sent the follow-up letter remembering the department in Chandler-Ullmann Hall in the early 1950s:

Dear Folks,

Thank you ever so much for your charming narrative about the years after my 1950-51 sojourn -- especially relating to Prof. Jud -- his humble life and avid personal attachment to the Department and to his younger cohorts. I do not have a photograph of the labs in my day -- but I do have a clear memory. My lab desk was in a 2-desk room just outside Prof. Jud's "cubby," his cluttered office near the main lab's entrance. Just outside the labs was the office of Prof. Ed Amstutz (1909-1983). He was my academic mentor as I was an organic chemistry major. I remember him as cheerfully helpful with a wry wit. Prof. Jud was my research mentor--a one-on-one relationship, always calm, supportive and encouraging.

I was a National Lead Co. (NL) chemist on a 1-year leave of absence with a research fellowship to pursue an MS degree. Baker Castor Oil Co. and the Minnesota Linseed Oil Co. were two NL subsidiaries, so my research was to create vegetable oil derivatives by trying to "break into the double bonds" of the "fatty acid" components of castor oil, linseed oil and olive oil for possible commercial use. Both Prof. Jud and Dr. Harvey Neville (1898-1983), as Department Chairman, "signed off" on my thesis -- *Reactions Between Allyl Esters of Mono-Carboxylic Acids and Esters of Olefinic Fatty Acids*.

[The only other corporate sponsor of the department at that time, to my knowledge, was the Hershey Chocolate Co. Its goal was to decrease the "blooming" of chocolate upon aging or climatic changes which manifested itself by an unpleasant beige-colored coating of the chocolate's surface.]

Lacking a PhD, in order to advance professionally in chemical research, I pursued an MBA at NYU at night--again with NL's financial support. Then in 1960, I entered Wall St. as a Financial Consultant and later became a Manager with a predecessor of Smith Barney until my retirement in 2009. My curiosity and love of chemical research carried over into finance with equal enjoyment.

In conclusion, I wish you all well. Please extend my gratitude to Jane for her warm hospitality at the time of my very pleasant visit. Also, I wish to express, albeit very belatedly, my indebtedness to Dr. Harvey Neville, who was invaluable to me in orchestrating my courses of study so that the degree could be completed in my allocated time. Another footnote of belated appreciation to Dr. Neville's then secretary who mercifully agreed to type my thesis and arranged for its binding at the very last minute !!

Very sincerely,
Eliot G. Gordon (MS 1951)

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**A SPECIAL THANK YOU TO NED HEINDEL FOR
HIS TIME AND NUMEROUS CONTRIBUTIONS
TO “MUDD IN YOUR EYE” HISTORICAL AND
ALUMNI NEWS – AND FOR THIS ISSUE’S
FEATURED SPOTLIGHT ON ALUMNI:
ROBERT D. RAPP.**

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