UCLA

Department of
Chemistry & Biochemistry
NEWSLETTER

In This Issue

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Jorge Torres Discovers Key Role for a Motor Protein in Cancer Cell Proliferation

Jorge Torres

Biochemistry Professor **Jorge Torres** discovered that suppressing STARD9, a newly identified protein involved in regulating cell division, could be a novel strategy for fighting certain cancers, as it stops malignant cells from dividing and causes them to die quickly. The study was published in the December 9, 2011 issue of *Cell*.

During the five-year study, designed to seek targets for anti-cancer therapies, Torres and co-workers found that depleting STARD9 also helped the commonly used chemotherapy drug Taxol work more effectively against cancers such as melanoma and non-small-cell lung cancers.

"Biology and metabolism are different in cancer cells, and check points that regulate normal cells are often misregulated in cancer, allowing the malignant cells to divide uncontrollably," Torres said. "Because of that, we set out to discover new cancer targets and, more specifically, proteins critical for cancer cell division that we could potentially target with therapeutics."

During division, cells form a microtubule-based mitotic spindle, a highly specialized and dynamic structure that aids in proper and equal chromosome transmission to the daughter cells, Torres said. Torres and his team sought to identify and characterize proteins necessary for spindle assembly and therefore vital to cell division. To find the proteins, they performed a high-throughput proteomic screen, uncovering 592 of them. Next, they performed a high-throughput genetic screen that knocked the proteins out one by one to see how that affected spindle function.

"The idea was to find something that arrested the cells while they were trying to divide and injured them in such a way that cell death occurred quickly," Torres said. "We were looking for a way to attack the cancer cells as they were dividing."

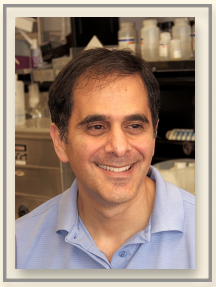
From the screens, Torres and his team selected the most promising protein. This was STARD9, a kinesin-like protein — a sort of molecular motor — that functions to form a stable mitotic spindle.

"When STARD9 is depleted in the cancer cells, the chromosomes attempt to align for transmission into the daughter cells but fail," he said. "They try for a while, but the chromosomes are being pulled apart from different directions and the DNA is tearing. In the end, their DNA condenses into a ball, and the cells die."

Torres said researchers knew that STARD9 existed in cells from computational analyses, but no one had characterized its function until now. The next step will be to confirm these findings in animal models by injecting mice with cancer cells and determining if depletion of STARD9 in these cells suppresses the formation of a tumor.

Torres is currently screening small molecules to find the ones that effectively inhibit STARD9's function. Finding a good STARD9 inhibitor could result in a new, less toxic combination therapy for certain cancers. Because depletion of the protein enhances the effectiveness of Taxol, Torres hypothesized that the chemotherapy drug, which causes many serious side effects, could, (continued on p. 17)

Chair's Message/Awards



Since I'll be stepping down from the department chairmanship at the end of June (having completed four years of a three-year term), I thought I might look to great farewell speeches of the past for inspiration. Several of our presidents have given inspiring farewell addresses with memorable lines, but many of these (such as Eisenhower's "beware the military industrial complex") don't seem particularly relevant.

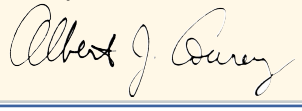
It occurred to me that a line from a Nixon farewell speech, "You won't have [Courey] to kick around anymore," might be more appropriate. But I think not! I've never been kicked around (well…almost never), but instead have been privileged to serve as chair of a great department for these last four years. While there have been stresses and strains, these have been more than counterbalanced by the pleasure of presiding over a department that regularly makes great contributions to our understanding of the natural world and that plays a vital role in molding the next generation of scientists. I hope that, as chair, I have had some positive impact, however small, on the life of the department, the careers of my colleagues, and the education of our students.

Some of the things I've enjoyed most about this job include:

- Being the first to hear when our faculty and students receive much deserved recognition for their transformative discoveries, and working to bring these discoveries to the attention of the world. Despite hard budgetary times, these breakthroughs continue unabated and a few of our recent findings and accolades are detailed in the pages of this newsletter.
- Having the opportunity to preside over events honoring our great faculty, students, and alumni. Recent examples include last fall's Seaborg festivities honoring alumnus and Nobel Laureate Richard Heck (p. 6), a wonderful reception held this spring in honor of Professor Sabeeha Merchant's election to the National Academy of Sciences (p. 2), and the upcoming departmental graduation ceremony, at which we will confer the first annual departmental alumni award upon Astronaut Anna Fisher (p. 11).
- Getting to know our loyal alumni and friends. Those I've had the pleasure to meet include Ralph and Charlene Bauer, Atsuko and Akira Fujimoto, Philip Gabriel, Robin Genchel, Gordon Gregory, Margy Kivelson, Roger Macomber, Phyllis Parvin, Bob and Adela Smith, Judi Smith, Fraser Stoddart, Ray and Dorothy Wilson, members of the Peter, Tsay, and Winstein families, and many others far too numerous to mention.
- Getting to work with our dedicated staff. This especially includes Chair's Assistant Mandy Bell, without whom this job would be impossible. I'm also tremendously indebted to Chief Administrative Officer Shahla Raissi. From the moment Shahla came on board, I felt a burden lift from my shoulders as a result of her remarkable ability to inspire the staff to give their best in support of the department.

With the end of this phase of my career, I will be glad to shift more of my focus back to the lab and the classroom. I know that the department will be in great hands under the next chair and I ask you to do everything you can to help this individual in the years ahead.

As great as has been our past, with your continued support, the best days for the Department of Chemistry & Biochemistry are still to come!



Sabeeha Merchant Honored by National Academy of Sciences and the Alexander Von Humboldt Foundation

Sabeeha Merchant

Professor Sabeeha Merchant, whose research is providing insights into the complex machinery of the cell, was elected to the prestigious National Academy of Sciences in recognition of her "distinguished and continuing achievements in original research," the academy announced May 1.

Membership in the academy is one of the highest honors given to a scientist in the United States. Among its most renowned members have been Albert Einstein, Robert Oppenheimer, Thomas Edison, Orville Wright and Alexander Graham Bell.

The election of Merchant, who this year is among 84 new members of the academy from the U.S. and 21 foreign associates from 15 countries, brings the number of current UCLA academy members to 41. Other NAS members from our department include Paul Boyer, Richard Dickerson, David Eisenberg, Mostafa El-Sayed, Juli Feigon, M. Frederick Hawthorne, Kendall Houk, Wayne Hubbell, Raphael Levine, Howard Reiss, and Joan Valentine. A reception was held in honor of Merchant's NAS election on May 10, 2012.

NAS Members (L to R): Wayne Hubbell, Kendall Houk, Sabeeha Merchant, Juli Feigon and David Eisenberg at the May 10 reception

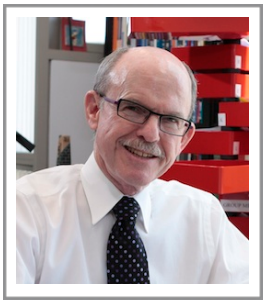
Additionally, Merchant was the recipient of a 2012 Humboldt Research Award. These awards, granted by the Alexander Von Humboldt Foundation to scientists from around the world, are aimed at fostering collaborations with German scientists. With support from this award, Professor Merchant will be spending her sabbatical this year at the Max Planck Institute in Potsdam, Germany.

During her stay in Germany, Professor Merchant "intends to further develop systems biology approaches in algae and explore the functions of new proteins that are linked to the evolution of photosynthesis." *Source: UCLA Newsroom*

NAS Members Group Photo: Penny Jennings

AWARDS

2012 Royal Society of Chemistry Robert Robinson Award



Kendall Houk

Professor Kendall Houk has been awarded the 2012 Robert Robinson Award by the Royal Society of Chemistry. This award is for contributions to organic chemistry made by a researcher after the age of 55.

Houk received his A.B., M.S., and Ph.D. degrees at Harvard University. He began his academic career at Louisiana State University in 1968, and then taught at Princeton (Visiting Professor, 1975-1976) and Pittsburgh (1980-1986) before coming to UCLA in 1986. He was Director of the Chemistry Division at the National Science Foundation (1988-1990) and is currently the Saul Winstein Chair in Organic Chemistry at UCLA.

The RSC Robert Robinson Award was presented for Houk's "inspirational and insightful development of the distortion/interaction theory of reactivity, pioneering studies of molecular dynamics of cycloadditions, and the innovative computational design of new enzymes."

The award will be presented at a symposium and lecture in the U.K. later this year. The award is named for Sir Robert Robinson, who received the Nobel Prize for Chemistry in 1947 and was a leading organic chemist of the mid-20th century. The first winner of the Robert Robinson Award was Houk's Ph.D. mentor, R. B. Woodward, in 1964. *Source: UCLA Newsroom*

Royal Society of Chemistry

Joan S. Valentine

Professor Emerita Joan Selverstone Valentine was admitted as one of five Honorary Fellows of the Royal Society of Chemistry for 2011. She was recognized for her significant contributions to the field of chemical sciences.

Valentine's current research looks at copper-containing proteins and their genetic role in amyotrophic lateral sclerosis (ALS, also known as Lou Gehrig's disease), as well as the role of "oxidative stress" in processes leading to human aging, cell death, and disease. *Source: UCLA Newsroom*

SPRING 2012 NEWSLETTER FACULTY, STAFF & CONTRIBUTORS
Editorial Board Albert J. Courey, Heather Maynard, Craig Merlic, Shahla Raissi
Editing & Production Kady Bell-Garcia
College Development & Alumni Relations Silvia Orvietani Busch, Kerri Yoder
Contributors Hannah Bateman, Mandy Bell, Thomas Cahoon, Albert J. Courey, Neil Garg, William Gelbart, David Gingrich, Erin Greiner, Patrick Harran, Kendall Houk, David Imai, Penny Jennings, Charles Knobler, Ken Lawson, Denise Mantonya, Silvia Orvietani Busch, Shahla Raissi, Andrew Roberts, Tristan Rose, Eric Scerri, Bob Scott, Bo Tendis, Melissa Woehrstein

UCLA Department of Chemistry & Biochemistry
607 Charles E. Young Drive East, Los Angeles, California 90095-1569

Xiangfeng Duan Honored by Office of Naval Research and Department of Energy

Xiangfeng Duan

Professor Xiangfeng Duan received a 2012 Office of Naval Research Young Investigator Award for his proposal titled "High Speed Graphene Transistors with Self-Aligned Nanowire Gate." The award includes a three-year grant to support research efforts that hold promise in advancing naval technology.

Duan's research interests include nanoscale materials, devices and their applications in future electronics, energy science, and biomedical science.

Additionally, the Department of Energy's Office of Science awarded Duan an Early Career Research Program Award. Duan's proposal, entitled "Rational Design and Nanoscale Integration of Multi-Heterostructures as Highly Efficient Photocatalysts," was selected from over 850 applications. He was one of 68 scientists recognized nationwide, and was the only professor at UCLA honored this year. *Source: UCLA Newsroom*

Neil Garg Wins Four Early Career Awards

Neil Garg

Professor Neil Garg was recognized for scientific excellence with four prominent early career awards from the Alfred P. Sloan Foundation, Hoffman-La Roche, Inc., AstraZeneca and the Beta Gamma Chapter of Alpha Chi Sigma, the professional chemistry fraternity.

He was one of 126 winners of a 2012 Sloan Research Fellowship from the Alfred P. Sloan Foundation, which has awarded fellowships since 1955 "to early-career scientists and scholars whose achievements and potential identify them as rising stars, the next generation of scientific leaders," according to a press release.

Additionally, Garg was awarded one of two 2012 Roche Excellence in Chemistry Awards by the Hoffmann-La Roche Inc. (Roche) company, which "recognizes and promotes high quality, innovative research in organic chemistry." He gave a plenary lecture at the Roche Symposium in May and received a research grant. (Continued on p. 4)

AWARDS

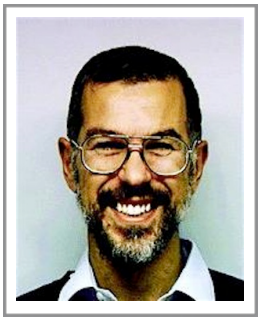
Awards (continued from p. 3)

Garg was also recognized as the only U.S. scientist to win the 2011 AstraZeneca Excellence in Chemistry Award for talented young academic researchers who have demonstrated distinct achievements in synthetic, computational, mechanistic or bioorganic chemistry.

As a recipient of an AZ Young Investigator Award, he was presented with a $50,000 unrestricted research grant intended to help foster continued growth and development of his research. AstraZeneca's Executive Vice President of Innovative Medicines Mene Pangalos was quoted in a press release as saying, "The medicines of tomorrow will come from the pioneering science of today and we are proud to recognize and support innovative academic research in chemistry through our global Excellence in Chemistry Awards Program."

Garg also earned the 2012 Glenn T. Seaborg Award presented by the Beta Gamma Chapter of Alpha Chi Sigma. This annual award recognizes outstanding achievements by early-career faculty in the Department of Chemistry and Biochemistry at UCLA. The emphasis is on research and scholarly impact, with consideration also given to outstanding teaching, mentoring and professional service. *Source: UCLA Newsroom*

David Bensimon Elected to European Molecular Biology Organization Membership



David Bensimon

Professor David Bensimon was elected as a 2011 member of the European Molecular Biology Organization. According to the EMBO Web site, "EMBO was founded in 1964 with the nomination of 200 scientists renowned for their excellence in research and outstanding contributions to what was then still the fledgling discipline of molecular biology. Ever since, the membership has grown year on year to include many of the most eminent researchers of the day."

Student Fellowships

Several Ph.D. students were awarded fellowships in recognition of their outstanding achievements in research: Kyle Quasdorf received the Bristol-Myers Squibb Graduate Fellowship in Synthetic Organic Chemistry; Noah Fine Nathel received the NIH Ruth L. Kirschstein NRSA Predoctoral Fellowship; and Alexander Huters was a Roche Symposium: Excellence in Chemistry Awardee.

The organic division also awarded four Senior Foote Fellowships this year to Adam Goetz, Elizabeth Noey, Stephen Ramgren, and Amanda Silberstein.

Herbert Tabor/Journal of Biological Chemistry Young Investigator Award

Erin Greiner

Doctoral candidate Erin Greiner was named the first recipient of the Herbert Tabor/Journal of Biological Chemistry Young Investigator Award. Greiner's research in Professor Joseph Loo's lab focuses on the function and mechanism of the huntingtin protein, the causal protein in Huntington's disease. She received her award at the Gordon Research Conference: CAG Triplet Repeat Disorders, which was held June 5-10, 2011 in Italy. *Source: www.asbmb.org, Photo Credit: Jeff Cantle*

Graduate Student Julio D'Arcy Awarded Prize at Collegiate Inventors Competition

Julio D'Arcy with Senator Barbara Boxer

Ph.D. student Julio D'Arcy, a member of Professor Richard Kaner's group, earned second prize in the 2011 Collegiate Inventors Competition – Graduate Division. This national competition, which was first held in 1990, is sponsored by the Abbott Fund, the Kauffman Foundation, and the United States Patent and Trademark Office.

D'Arcy received the award, which comes with a $12,500 cash prize, for his development of a technology for coating nanostructured materials such as conducting polymers onto virtually any surface, including flexible plastics. This invention is a universal and green solution to thin-film deposition that leads to high quality and large-scale continuous coatings of organic and inorganic electronic materials in a matter of seconds.

AWARDS

14th Annual Molecular Biology Institute Postdoctoral Recognition Awards

Front Row (L to R): David Mulholland, Peng Liu, Pao-Yang Chen, Mahavir Singh, Sika Zheng, Ajay Vashisht, Toh Hean Ch'ng
Back Row (L to R): Hong Wu, Kendall Houk, Matteo Pellegrini, Randall Hungate (Amgen), Juli Feigon, Paul Boyer, Dean A. Eugene Washington, Douglas Black, James Wohlschlegel, Kelsey Martin

The 14th Annual Molecular Biology Institute/Chemistry & Biochemistry Postdoctoral Awards Ceremony and Reception took place on May 9, 2012, from 3:00-4:30 p.m., in Boyer Hall. In 1999, Professor Emeritus Paul D. Boyer, nobel laureate and founding MBI Director, donated a portion of his nobel prize to recognize outstanding research contributions from postdoctoral fellows. Generous donations were also received from Mrs. Phyllis Parvin and the Parvin Foundation, Dr. James and Joan Peter, and Amgen, Inc. This year, seven $2,000 Research Excellence awards were presented, and three of those seven recipients also received $8,000 Special Recognition Awards from our donors. Professor Emeritus Boyer presented the Boyer-Peter Award, Dr. Randy Hungate, Executive Director of Research for Amgen Inc., presented the Amgen Award, and, standing in for Mrs. Phyllis Parvin, A. Eugene Washington, Dean of the Geffen School of Medicine, presented the Parvin Foundation Award.

The recipients of these three donor awards were: Ajay Vashisht, Ph.D. (Mentor: Prof. James Wohlschlege, Biological Chemistry, Recipient of the Boyer-Peter Award), Toh Hean Ch'ng, Ph.D. (Mentor: Prof. Kelsey Martin, Biological Chemistry, Recipient of the Parvin Foundation Award), David Mulholland, Ph.D. (Mentor: Prof. Hong Wu, Molecular & Medical Pharmacology, Recipient of the Amgen Award)

The four additional Research Excellence Awards were presented to: Dr. Pao-Yang Chen (Mentor: Prof. Matteo Pellegrini, Molecular, Cell & Developmental Biology), Dr. Peng Liu (Mentor: Prof. Ken Houk, Chemistry & Biochemistry), Dr. Mahavir Singh (Mentor: Prof. Juli Feigon, Chemistry & Biochemistry), and Dr. Sika Zheng (Mentor: Prof. Doug Black, Microbiology, Immunology & Molecular Genetics).

Department of Chemistry and Biochemistry Awards Ceremony 2011

2011 Foote Fellows: Shane Stone, Courtney Roberts, Alex Huters, Judy Szeto, Hao Wang, and Andrew Roberts with Judith Smith and Ken Houk.

McCoy Awardees: Neil Garg and Xiangfeng Duan with Dean Joseph Rudnick

The Department of Chemistry and Biochemistry Awards Ceremony was held on November 7, 2011 in the Court of Sciences. Four of our donors attended, including Ralph and Charlene Bauer, Gordon Gregory and Michael Whalen. Four representatives of the UCLA administration also presented some of the awards and fellowships. They included Dean Joseph Rudnick, Vice Provost and Dean Robin Garrell, Associate Dean Carlos Grijalva, and Vice Provost and Dean Judith Smith. In addition to recognizing the efforts of our fantastic students and faculty, the event showcased our department as a center for excellence in teaching and research.

Recipients of graduate and faculty awards are listed below:

Christopher Foote Fellows: Alexander Huters, Andrew Roberts, Courtney Roberts, Shane Stone, Judy Szeto, and Hao Wang

Excellence in Second Year Academics and Research: Adam Goetz, Cathy Yan Jin, Hong Hanh Nguyen, and Yue Jessica Wang

Hanson-Dow Teaching Assistant Awards: Ian Andrews, Jack Bracken, Yen-Ting Janie Chen, Colin Douglas, Maria Dzialo, Yi Chiao Fan, Godwin Kanu, Peter Klonowski, Zhao Li, Stephen Ramgren, Hung Pham, Megan Sjodt, and Xiaoming Zhu

Ralph & Charlene Bauer Research Award for research in Inorganic Chemistry: William Morris

George Gregory Award for research in Physical Chemistry: Soo Hong Kim

Ernest F. Hare, Jr., Memorial Scholarship for Research: Wenliang Huang

Majeti-Alapati Fellowship for research in Organic Chemistry: Ian Andrews

John Stauffer Fellowship for most outstanding research in the Department of Chemistry and Biochemistry: Sarah Bronner

Samson H. Cheng Biochemistry Teaching Award: Matthew Graf and Huimin Zhang

John M. Jordan Memorial Award for research in Biochemistry: Yuewei Sheng

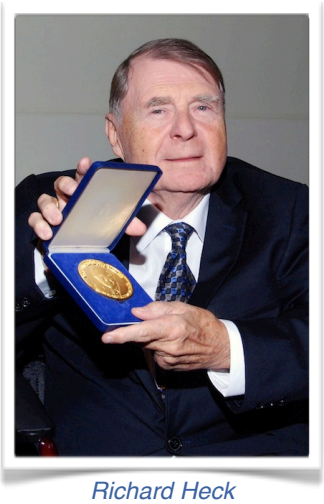
Roberts A. Smith Research Award: Timothy Anderson

Hanson-Dow Award for Excellence in Teaching: Neil Garg

The Herbert Newby McCoy Award: Xiangfeng Duan and Neil Garg

Photos: Penny Jennings

SEABORG SYMPOSIUM & DINNER



Richard Heck

Every year since 1987, the Department of Chemistry and Biochemistry has awarded the Glenn T. Seaborg medal to an internationally renowned scientist to honor groundbreaking advances in chemistry or biochemistry, or transformational contributions to science policy. Each year, the medal is presented in an evening banquet and medal awards ceremony held during the fall quarter. The evening banquet is preceded by an afternoon symposium organized around a topic of special interest to the medalist. This past fall, the 2011 Seaborg Medal was confirmed upon UCLA alumnus and 2010 chemistry Nobel Laureate Richard Heck, while this coming fall the 2012 Seaborg Medal will be awarded to 1989 medicine and physiology Nobel Laureate Harold Varmus.

Glenn T. Seaborg, a UCLA chemistry alumnus, was one of the most influential chemists of the 20th century. He was the recipient of the 1951 Nobel Prize in Chemistry for the discovery and characterization of ten transuranium elements and had the unique distinction of having element 106, Seaborgium, named after him while he was still alive.

2011 Richard F. Heck

The 2011 Glenn T. Seaborg Symposium & Medal Presentation dinner was held on Saturday, November 5, 2011 in the CNSI Auditorium and the Covel Commons. Richard F. Heck, the 2011 Seaborg Medalist, is the Willis F. Harrington Professor Emeritus of Chemistry and Biochemistry, University of Delaware. The theme of the symposium was "The Heck Reaction and Cross-Couplings."

Symposium speakers Barry Trost, Larry Overman, Stephen Buchwald and Craig Merlic with Richard Heck and Chancellor Gene Block

Heck was born in Springfield, Massachusetts on August 15, 1931. His passion for chemistry stemmed from his interest in growing orchids, and his interest culminated in his majoring in chemistry at UCLA, where he received his bachelor's degree in 1952 and his Ph.D. in 1954, under the supervision of Professor Saul Winstein. In 1956, following postdoctoral studies at the Swiss Federal Institute of Technology in Zurich and UCLA, Heck went to work for the Hercules Powder Co. (now Ashland Inc.) at their research center in Wilmington, Delaware. In a defining moment, his supervisor, Dr. David Breslow, suggested that Heck "do something with transition metals." Few could have foreseen that this suggestion would transform modern organic chemistry and give rise to the vast and important field of transition metal catalysis. Most significantly, Heck discovered how the transition metal palladium could be utilized to catalyze the formation of new carbon-carbon bonds. More than 40 years after his pioneering discovery of this reaction (now known as the Heck reaction), Richard Heck shared the 2010 Nobel Prize with the Japanese chemists Ei-ichi Negishi and Akira Suzuki for their work in palladium-catalyzed cross-coupling in organic synthesis. *Source: The Nobel Foundation*

Photos: Penny Jennings

Harold Varmus

2012 Harold Varmus

The next Glenn T. Seaborg Medal will be presented to Harold Varmus, 1989 Nobel Laureate in Physiology or Medicine (with Michael Bishop) for the discovery of cellular oncogenes, former Director of the National Institutes of Health, and current director of the National Cancer Institute. The Glenn T. Seaborg Symposium & Medal Presentation will be held on December 7, 2012 at the CNSI Auditorium and the Covel Commons.

The theme of the symposium will be "Can Scientists Make the World a Better Place Through Discovery, Dissemination, and Application of Knowledge?" Guest speakers will include Michael Eisen (UC Berkeley and Lawrence Berkeley National Lab), Levi Garraway (Department of Biological Chemistry and Molecular Pharmacology, Dana-Farber Cancer Institute/Brigham,Women's Hospital Broad Institute of Harvard and MIT), and Prabhat Jha (University of Toronto Chair in Disease Control, Director, Centre for Global Health Research, LKSKI/KRC, St. Michael's Hospital, Toronto). Please see p.7 for a biography of Harold Varmus.

Photo Credit: National Cancer Institute

SEABORG SYMPOSIUM/HAPPENINGS

2012 Glenn T. Seaborg Medalist: Harold Varmus

Harold Varmus

Upon acceptance of the 1989 Nobel Prize in Physiology or Medicine (with Michael Bishop) for the discovery of cellular oncogenes, **Harold Varmus** compared the formation of cancer cells from healthy cells to a literary villain, Grendel in *Beowulf*, stating, "In our adventures, we have . . . seen our monster more clearly and described his scales and fangs in new ways–ways that reveal a cancer cell to be, like Grendel, a distorted version of our normal selves."

This comparison paid homage to his love of literature, which he first experienced growing up in Freeport, New York and later pursued as an undergraduate at Amherst College, serving as editor of his campus newspaper. He received a Woodrow Wilson Fellowship to further pursue English literature studies at Harvard University, earning a master's in English, but soon after decided to attend the Columbia College of Physicians and Surgeons.

Drawn to the study of general medicine, while also fascinated by international medicine and psychiatry, he served as an apprentice in an India mission hospital, as a medical house officer at Columbia-Presbyterian Hospital, and as a Clinical Associate in Ira Pastan's laboratory at the National Institutes of Health. According to an autobiography published by The Nobel Foundation, Varmus' "studies of bacterial gene regulation by cyclic AMP" encouraged him to then pursue a postdoctoral position studying tumor virology at University of California, San Francisco Medical School, where he was first introduced to Mike Bishop in 1969. He later became a lecturer at UCSF in the Department of Microbiology and Immunology, advancing to Professor in 1979. Largely working with Bishop, he studied "the behavior of retroviruses: various aspects of their unusual life cycle, the nature and origin of their transforming genes, and their potential to cause genetic change," and also studied hemoglobinopathies, glucocorticoid action, and hepatitis B viruses with various faculty members during his 20 plus years at UCSF.

President Bill Clinton named him director of the National Institutes of Health in 1993. Serving as director until 1999, Varmus brought great change to the organization pertaining to the ways in which intramural and extramural research programs were carried out, while also filling NIH positions with respected leaders, overseeing the construction of three buildings, including the Mark O. Hatfield Clinical Research Center, and helping to increase the NIH budget.

Varmus went on to serve as the President and Chief Executive Officer of Memorial Sloan-Kettering Cancer Center, where he worked toward providing quality care to cancer patients. According to a National Cancer Institute biography, "Under his leadership, the scientific programs were reorganized and enlarged; a new research building, the Mortimer B. Zuckerman Research Center, was constructed; and new graduate training programs were established in chemical biology, computational biology, and in cancer biology." He also oversaw the construction of additional cancer centers, such as the Evelyn H. Lauder Breast Center, the MSKCC Imaging Center, and the Ralph Lauren Center for Cancer Care and Prevention.

Authoring over 300 publications and several books, Varmus has been the recipient of many prestigious awards, including the Vannevar Bush Award and the National Medal of Science. Many awards were jointly received with Bishop, such as Scientist of the Year by the California Academy of Sciences (1982), the Lasker Award for Basic Medical Research (1982), the Gairdner Foundation Award (1983), the Alfred P. Sloan Prize of the General Motors Cancer Research Foundation (1984), and the aforementioned Nobel Prize in Physiology or Medicine (1989).

His long list of accomplishments and commitments demonstrates his passion for cancer research (continued on p. 17)

Happy 90th Birthday to Howard Reiss and Bob Scott!

Bob Scott and Howard Reiss

Physical chemists and emeriti Howard Reiss and Bob Scott first met in the 1940's when they were graduate students in chemistry at Princeton. Their paths split when Howard was drafted into the army. After receiving his Ph.D. in 1945, Bob spent some time at Los Alamos, where he took a post-doc position with Joel Hildebrand at Berkeley, and joined our department as Assistant Professor in 1948.

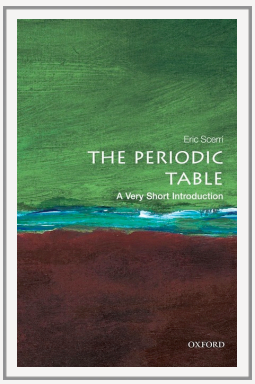
After discharge from the army, Howard continued his graduate studies at Columbia. After two years on the faculty at Boston University, he went into industry, first at Bell labs and then as a founding director of the North American Aviation Science Center. He reunited with Bob when he came to UCLA in 1968.

They have been colleagues for 44 years. Bob and Howard very nearly share a birthdate; we celebrated Bob's 90th birthday and Howard's 90th birthday on March 20 and March 31, 2012, respectively. Happy 90th, Bob and Howard! *Source: Charles Knobler*

Photo Credit: A. Adler/Memorial Sloan-Kettering Cancer Center

HAPPENINGS

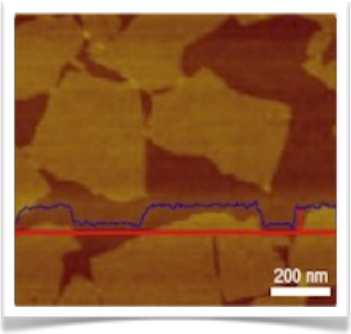
Translating the Periodic Table



Freshmen chemistry lecturer Eric Scerri recently published *A Very Short Introduction to the Periodic Table* (Oxford University Press, December 2011), which is one of about 300 in Oxford's "Very Short Introductions" series. This new book expands on Scerri's previously published book on the periodic table, further examining the development of the periodic table, adding a chapter on "the synthesis of elements beyond element 92," and providing more details on other versions of the periodic table from scientific and philosophical perspectives. *A Very Short Introduction to the Periodic Table* was favorably reviewed in *The Guardian*.

Additionally, a French translation of Scerri's *The Periodic Table, Its Story and Its Significance* (Oxford University Press, 2007), which has also been translated into Japanese, was published in late 2011. More information on the periodic table, the history and philosophy of science, and radio and TV documentaries can be found at Scerri's new Web site: http://ericscerri.com.

Article Exceeds 1,000 Citations



An atomic force microscope (AFM) image of chemically converted graphene pieces indicate that their thickness (blue trace) is <1 nanometer when scanned along the red line.

Professor Richard Kaner co-authored the most highly cited article in the six-year history of the journal *Nature Nanotechnology* and the first one to pass 1,000 citations, according to the Web of Science.

The article, entitled "Processable Aqueous Dispersions of Graphene Nanosheets" (*Nature Nanotechnology 3*, 101-105, 2008) explains a scalable method for chemically reducing graphite oxide to graphene. Since the materials are inexpensive and dispersible in water, they may pave the way for applications of graphene.

With an impact factor in excess of 30, *Nature Nanotechnology* is by far the highest impact journal in the nanosciences and one of the highest impact journals in all of the natural sciences.

Recruitment for Fall 2012 Admission to the Departmental Ph.D. Programs

Left: Professor Paul Weiss and attendees at the March 23 wine and cheese poster session
Right: Students at the March 2 wine and cheese poster session

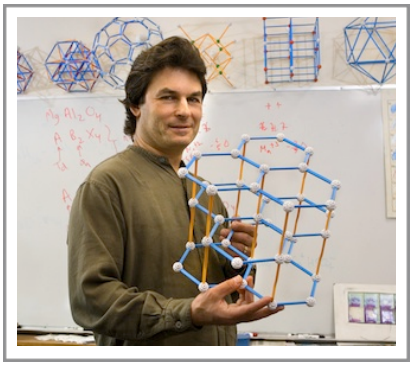
This year the Department of Chemistry and Biochemistry hosted a total of seven visitation days and hosted a total of 135 visitors (last year the department hosted 100 visitors). Applicants from all over the country visited UCLA's Chemistry and Biochemistry programs from January to March.

Each recruitment day is a grand orchestration that consists of several faculty meetings, lab and campus tours, and a wine and cheese student poster session and dinner at the UCLA Faculty Center. During applicants' visits, the Graduate Office plans interviewees' itineraries and current students serve as escorts, attending lunches and dinners and sharing their perspectives of graduate school.

As a result of these recruitment efforts, 59 outstanding new students will be joining the departmental Ph.D. programs in Chemistry and in Biochemistry & Molecular Biology in the fall of 2012. With over three hundred continuing students, the department is the largest Ph.D. granting unit in the UCLA College of Letters and Science.

HAPPENINGS

Teaching Teachers to Make Sense of Sensors



Richard Kaner

When **Professor Richard Kaner** discusses such terms as "polyaniline nanofibers," "conducting polymers," and "chemical sensors" with people who do not possess degrees in the chemical sciences, he is sometimes met with puzzled stares or looks of general confusion.

However, this sort of reaction is something Professor Richard Kaner is used to dealing with when he discusses his research. Even his title sounds intimidating: He's a professor with joint appointments in Chemistry and Biochemistry in the College of Letters and Science and in Materials Science and Engineering at the UCLA Henry Samueli School of Engineering and Applied Science.

But Kaner, who recently received an American Chemical Society Award for Chemistry of Materials, insists his work is actually so simple to comprehend that not only can his undergraduate and graduate students *get it*, but high school students as well.

And that's exactly what the California NanoSystems Institute (CNSI) put to the test on Feb. 25 when they hosted some 20 Southern California high school teachers at a workshop dedicated to Kaner's research on nanowire sensors.

Teachers at the workshop, part of CNSI's High School Nanoscience Outreach Program, learned how Kaner's laboratory uses a highly conductive polymer substance called polyaniline to make sensors that can detect various types of chemical vapors.

The sensors produced can then be placed in electronic "noses," which may be used for a variety of tasks, from helping a baker ensure that the bread he bakes one day is just as done as the bread he made the day before to helping the Air Force determine what happens to plumes of smoke after rockets launch.

The workshop featured experiments on a much smaller scale, but the fundamentals of the science remained the same, Kaner said.

"We show them how to build sensors out of conducting polymers. Then we send the teachers back with some polyaniline dispersed in water," said Kaner. "We give them … enough stuff to teach several science classes."

Kaner explained that part of the philosophy behind the program is to make cutting-edge science accessible to everyone, especially high school freshmen who will be entering college four years from now.

It wasn't until Kaner got to college that he became interested in materials chemistry, largely due to his boredom in his first-year chemistry lecture.

Teachers who took part in CNSI's High School Nanoscience Outreach Program learned how a highly conductive polymer substance called polyaniline is used to make sensors that can detect various types of chemical vapors.

In college, Kaner found the doors wide open to experimentation. "I asked if I could do research, and one professor gave me a project. … I spent four years doing undergraduate chemistry research and got very interested in materials."

His early exposure to research is part of the reason why Kaner works with undergraduates as well as graduate students in his UCLA lab.

Somehow, he manages to juggle it all — teaching students, outreach through CNSI (where he spent two years as an associate director) and the multiple research projects he conducts with scientists from UCLA's Boelter Hall to Australia.

Even his papers have crossed the globe: One of Kaner's articles published in 2008 surpassed 1,000 citations in January and became the most cited piece ever published by the journal *Nature Nanotechnology* (see p. 8).

Professor Albert J. Courey, chair of chemistry and biochemistry, explained that Kaner's work is "paving the way to breakthroughs in semiconductor technology, chemical sensors and super-hard materials."

Kaner is popular among students because of his ability to make difficult scientific concepts "both accessible and exciting," Courey said.

There's one last tidbit you might not have guessed about Kaner: He has something in common with boxer Sugar Ray Leonard.

Leonard and Kaner became acquainted because their children were on the same soccer team. One evening at dinner, Kaner told the former boxer that they had both been pictured in *Sports Illustrated*. But Leonard couldn't guess why.

Not for boxing, Kaner told him, but for chess. At 17, Kaner won the National High School Chess Championship.

Source: UCLA Today

Photo Credit: Reed Hutchinson

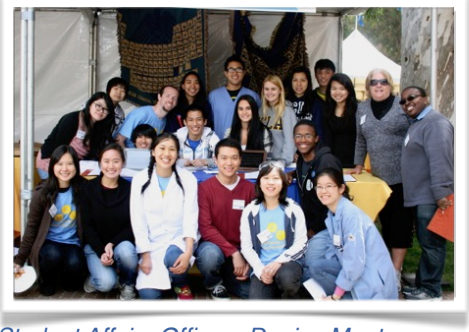
HAPPENINGS

Graduate students share passion for chemistry with families at UCLA Alumni Day

UCLA Alumni Day

Thousands of UCLA alumni, their families and friends participated in UCLA Alumni Day, which took place on May 5, 2012. Three chemistry graduate students, Liana Hie, Tejas Shah, and Noah Fine Nathel, joined Professor Neil Garg to represent the Department of Chemistry and Biochemistry at the Info Fair, which ran from 9:00 a.m. to 12 p.m. The Department's activity booth included dry-ice volcano demonstrations, a make-your-own silly putty station for kids, and chemistry trivia games. More than 200 alumni and their families visited the booth, and many of them took home fun prizes, including chemistry decorated stickers, t-shirts, and beach balls.

Over 1,700 alumni and guests registered for UCLA Alumni Day 2012, almost twice the number of guests who registered last year. Twenty-five college departments and programs participated in the morning Info Fair, including the Chemistry Department. The Info Fair was once again very successful, thanks to all of the alumni who stopped by. We look forward to seeing you again at next year's UCLA Alumni Day!



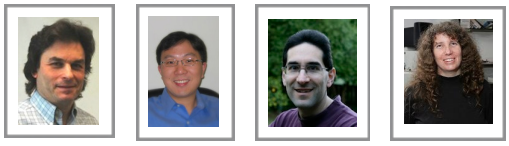
Student Affairs Officers Denise Mantonya and Timothy Mahlanza (top right) with student volunteers from AXE and SAACS at the Bruin Day 2012 Department of Chemistry and Biochemistry booth.

Bruin Day 2012

The second annual Bruin Day, which welcomed prospective freshmen students and their parents to the UCLA campus, took place on April 14 from 9:00 a.m.-5:00 p.m. and was a huge success! The Chemistry and Biochemistry Department booth was located outside of Powell Library.

The Undergraduate Office and several student volunteers from Student Affiliates of the American Chemical Society (SAACS), Alpha Chi Sigma (AXE), and the LUCE Scholars hosted the booth throughout the day. Dozens of prospective students visited the booth. They were thrilled that current students were available to answer all of their questions, including what UCLA life is all about. A few students and parents also asked to see the department, and AXE and SAACS took a group to Young Hall for a tour.

Energy & Our Future: Innovative Approaches to Energy Storage and Production



Professors Richard Kaner, Xiangfeng Duan, Benjamin Schwartz, and Sarah Tolbert

A special research event, titled "Energy & Our Future: Innovative Approaches to Energy Storage and Production," was held on May 16, 2012 from 4:30-7:30 p.m., in 2033 Young Hall.

Professors Benjamin Schwartz and Xiangfeng Duan gave presentations on new strategies for capturing the sun's energy. Schwartz's talk was titled "Can Plastic Solar Cells Provide for Our Energy Needs?" and Duan's talk was titled "Towards Artificial Photosynthesis." Professors Richard Kaner and Sarah Tolbert gave presentations on new strategies for storing energy. Kaner's talk was titled "Graphene Supercapacitors," and Tolbert's talk was titled "Nanoporous Pseudocapacitors and Batteries."

A reception at the Winstein Commons followed the presentations.

62nd Annual Los Angeles County Science Fair

Professor Neil Garg, Tejas Shah, Noah Fine Nathel, Stephen Ramgren, Liana Hie, Adam Goetz, and Amanda Silberstein

Many graduate students in the Department of Chemistry and Biochemistry judged the junior (middle school) and senior-level (high school) divisions of the 62nd Annual Los Angeles County Science Fair, which was held on March 30, 2012 at the Pasadena Convention Center.

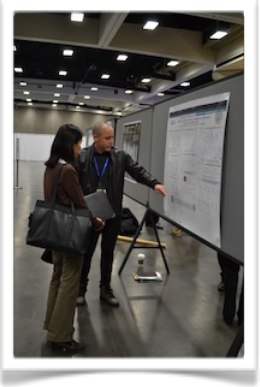
Kenneth Lee, a senior from Palos Verdes Peninsula High School was awarded the highest prize for his project in the biochemistry and molecular biology category, titled "The Role of Testosterone in Hepatocyte Apoptosis in High Fat Diet-Induced Non-Alcoholic Fatty Liver Disease." In the junior-level division, Raymond Gilmartin, an eighth-grader at South Pasadena Middle School, won the top prize for his project in the physics-aerodynamics and hydrodynamics category, titled "Spare the Environment, Spoiler the Car."

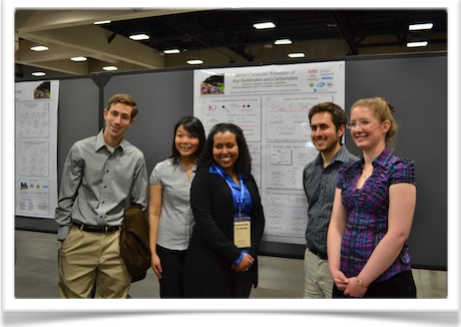
DISTINGUISHED LECTURES

UCLA Research Showcase at 2012 Spring American Chemical Society National Meeting

A UCLA Research Showcase poster session and reception was held at the 2012 Spring American Chemical Society National Meeting & Exposition in San Diego on March 25, 2012. Faculty, postdoctoral students and graduate students attended to explore new discoveries in chemistry and biochemistry.

Generous sponsors of the event included The Center for Reticular Chemistry, The Christopher S. Foote Chair in Chemistry and Biochemistry, The Irving and Jean Stone Chair in Physical Sciences, The Donald J. and Jane M. Cram Chair in Organic Chemistry, The Saul Winstein Chair in Organic Chemistry, and the Fred Kavli Chair in NanoSystems Sciences.





Left: Ph.D. student Andrew Roberts (Harran Lab) and ACS member Right: Ph.D. students Stephen Ramgren, Liana Hie, Tehetena Mesganaw, Noah Fine Nathel, and Amanda Silberstein (Garg Lab)

Astronaut Anna Fisher to Receive Alumni Award

Anna Fisher

Astronaut and alumna Anna Fisher will accept the first annual UCLA Chemistry & Biochemistry Alumni Award and will also give an address at the department graduation ceremony on June 16, 2012. Fisher received a B.S. in chemistry from UCLA in 1971, going on to receive an M.D. in 1976, and an M.S. in chemistry in 1987, also from UCLA.

Fisher was selected as an astronaut candidate by NASA in January 1978, and she served as a Crew Representative and physician on several crews. She was a mission specialist on STS-51A, which launched from Kennedy Space Center, Florida, on November 8, 1984 and successfully returned on November 16, 1984. Fisher currently serves as a Management Astronaut in both the Space Shuttle Branch and the Exploration Branch of the Lyndon B. Johnson Space Center in Houston, Texas.

M. Frederick Hawthorne Lecture & Dinner

Chad A. Mirkin

Chad A. Mirkin, the George B. Rathmann Professor of Chemistry at Northwestern University and Director of the International Institute for Nanotechnology, presented the 2012 M. Frederick Hawthorne Lecture, held on April 25, 2012 in the CNSI Auditorium. The lecture was followed by dinner in the UCLA Faculty Center.

Professor Mirkin is a nanoscience expert, well-known for his development of nanoparticle-based biodetection schemes, the invention of Dip-Pen Nanolithography, and contributions to supramolecular chemistry, nanoelectronics, and nanooptics. Mirkin's lecture was titled "'Artificial Atoms' Formed from Nucleic Acid-Nanoparticle Conjugates."

The 2012 M. Frederick Hawthorne Lecture and Dinner was made possible by the Raymond and Dorothy Wilson Endowment.

Christopher S. Foote Lecture

Peter R. Ogilby

Professor Peter R. Ogilby, from the Center for Oxygen Microscopy and Imaging, Department of Chemistry Aarhus University, presented the third annual Christopher S. Foote Lecture on April 26, 2012.

Ogilby's presentation was titled, "Singlet Oxygen Today: From Mammalian Cells and Two-Photon Processes to Gold Nanoparticles," and focused on "methods to selectively control the photo-sensitized production of singlet oxygen in single mammalian cells."

A reception was held in Young Hall at 4:00 p.m. and was followed by the Foote Lecture at 5:00 p.m.

DISTINGUISHED LECTURES

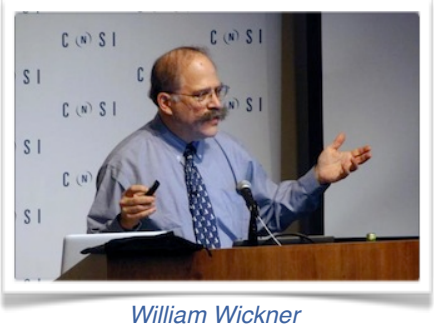
Norma Stoddart Prize Lecture

Greg Kuzmanich and Fraser Stoddart

The first annual Norma Stoddart Prize Lecture was presented by Gregory Kuzmanich (formerly of the Garcia-Garibay Group, currently a postdoctoral scholar of the Wasielewski Group, Northwestern University), on January 19, 2012. It was titled "Photonic Amplification by a Singlet-State Quantum Chain Reaction in the Photodecarbonylation of Crystalline Diarylcyclopropenones."

The Norma Stoddart Prize for Exemplary Citizenship and Excellence in Graduate Research is funded by an endowment at UCLA from the Stoddart Family Trust. Norma Stoddart was the wife of Fraser Stoddart, Saul Winstein Chair in Organic Chemistry (1997-2003), Fred Kavli Chair of NanoSystems Sciences (2003-2007) while he was the director of the California NanoSystems Institute (CNSI), and a faculty member of UCLA. Norma was a caring and loving mother to Fiona McCubbin and Alison Stoddart-Ho, both of whom were chemistry majors at Imperial College London (ICL) and Cambridge University, respectively, going on to obtain their Ph.D. degrees in chemistry (Fiona at ICL and Alison at Durham University). Norma was also a chemistry major at Edinburgh University, where she subsequently obtained a Ph.D. degree in biochemistry within the Medical School. She was an active participant in many activities organized by the Department of Chemistry and Biochemistry at UCLA from 1997 until the time of her passing in 2004. The Norma Stoddart Prize honors graduate students who best remind us of the outstanding science, service and humanity that Norma brought to UCLA. Recipients receive a $5,000 award and a commemorative plaque.

David S. Sigman Memorial Lecture & Symposium



William Wickner

Professor William Wickner, the James C. Chilcott '20 Distinguished Professor of Biochemistry at Dartmouth Medical School, was honored as this year's Sigman Lecturer, on February 2, 2012 in the CNSI Auditorium.

Wickner presented a lecture titled, "Membrane Fusion Mechanisms: 5 Lipids, 4 SNAREs, 3 Chaperones, 2 Nucleotides, and a Rab, All Dancing in a Ring!" The lecture was followed by a reception and poster session in the CNSI Foyer.

Wickner received his M.D. from Harvard Medical School before moving on to a postdoctoral position with Arthur Kornberg at Stanford. In 1976, he obtained a faculty appointment at UCLA in the Department of Biological Chemistry, and served as Assistant Director of the Molecular Biology Institute from 1985-88, and as Associate Director from 1989-92, under the directorship of Richard Dickerson. During his time at UCLA, Wickner became a beloved teacher and colleague, beginning his longtime friendship with David Sigman. He went on to become the Chair of the Department of Biochemistry at Dartmouth from 1993-2000.

The Molecular Biology Institute, with generous contributions from family and friends, established the David. S. Sigman Memorial Fund in 2002. The fund ensures that the Sigman Lectureship will continue in perpetuity to honor individuals for their significant contributions to chemical biology. Sigman was an internationally renowned UCLA professor, with joint appointments in the Department of Chemistry and Biochemistry and the Department of Biological Chemistry, who discovered chemical nucleases and illuminated the molecular mechanisms by which enzymes catalyze biological reactions. He was one of the founding members of UCLA's Molecular Biology Institute, serving as its associate director from 1994-2001. He died November 11, 2001, at the age of 62, after a two-and-a-half-year battle with brain cancer.

Emeriti Professors Irving Zabin and Audree Fowler with William Wickner

William Wickner with a student at the poster session

Photos: Penny Jennings

DISTINGUISHED LECTURES

A Tribute to Steven G. Clarke –Symposium on The Biochemistry of Aging

Steven G. Clarke and Luisa Iruela-Arispe

In honor of Professor Steven Clarke's service as Molecular Biology Institute (MBI) director from 2001 to 2011, the MBI held a symposium in Clarke's honor entitled: "The Biochemistry of Aging." The event occurred on April 12, 2012 in Boyer Hall.

Professor Clarke received his B.A. degree from Pomona College in 1970 and his Ph.D. degree from Harvard University in 1976. After a two-year postdoctoral appointment as a Miller Fellow at UC Berkeley, he joined the UCLA faculty in 1978. The symposium included a talk from Professor Clarke entitled "Disciplining Bad Biomolecules, What Can a Biochemist Tell You About Aging?" as well as talks from Professor Emeritus George M. Martin (Department of Pathology, University of Washington), and Professor Stephen G. Young (Department of Medicine, UCLA).

Tributes to Professor Clarke were given by Luisa Iruela-Arispe, MBI Interim Director, who presented him with an award that read, "To Steve Clarke, MBI Director, 2001-2011, for your commitment and devotion to the faculty, students and staff of the Molecular Biology Institute, UCLA"; Victoria Sork, Dean of Life Sciences; Emil Reisler and Fred Eiserling, former Deans of Life Sciences; and by several additional colleagues, lab members and friends of Professor Clarke.

Regents' Lecture

William Eaton

William Eaton, a National Institutes of Health distinguished investigator and a leading expert on the physics of proteins, served as the 2012 Regents' Lecturer at UCLA, presenting three free public lectures on campus, on February 13, 16 and 17.

A member of the National Academy of Sciences, Eaton has served as chief of the Laboratory of Chemical Physics, the principal biophysical science laboratory at NIH since 1986. He earned his Ph.D in physical chemistry and laser spectroscopy from the University of Pennsylvania after graduating from medical school.

"He started his career thinking about proteins from a statistical, mechanical, and physical point of view," Professor William Gelbart said. "This was quite exceptional at the time, the 1960s, when the field of biophysics — large and mature today — was only in its infancy. He was one of the first scientists setting out to learn from single-molecule spectroscopy experiments about the dynamics of how proteins aggregate and fold into their biologically active forms."

Source: UCLA Newsroom

The Physical Chemistry Seminar Series

Stuart Rice and Bob Scott

The Physical Chemistry seminar series is enriched by three named lectures, one each quarter.

The Scott lecture, which honors Professor Emeritus Bob Scott, is given in the fall quarter. This year's Scott lecturer was Professor Stuart Rice from the University of Chicago. Stuart, a leader in statistical mechanical experiment and theory, is a long-time member of the National Academy and was a recipient of the prestigious Wolf Prize in 2011.

Richard B. Bernstein

In the Winter Quarter, another Academy member, Eric Heller, presented the 10th Annual Kivelson Lecture (see p. 14).

In the Spring Quarter, Marsha Lester, the Edmund J. and Louise W. Kahn Distinguished Professor in the Natural Sciences at the University of Pennsylvania, presented the Richard B. Bernstein Lecture on April 23. Lester's research combines new experimental and theoretical approaches to probe inter-molecular surfaces between reactive (continued on p. 17)

DISTINGUISHED LECTURES

Saul Winstein Lecture

C. Dale Poulter

The Ninth Annual Winstein Lecture was held on October 27, 2011, and featured C. Dale Poulter as the Winstein Lecturer. Poulter gave a talk titled, "Evolution of Function in the Isoprenoid Biosynthetic Pathway from the Perspective of a Physical Organic Chemist."

Poulter received his B.S. degree in chemistry from Louisiana State University. He earned his Ph.D at the University of California, Berkeley, working with Bill Dauben on the photochemistry of dienes, and moved to UCLA as a NIH Postdoctoral Fellow with Saul Winstein, working on direct observation of carbocations in superacid media. Poulter was appointed Assistant Professor in the Chemistry Department at the University of Utah in 1969 and is now the John A. Widtsoe Distinguished Professor of Chemistry.

Following the lecture in Young Hall, a reception was held at Winstein Cafe Commons, which was attended by various chemists from around Los Angeles, Carolee Winstein, daughter of Saul Winstein and a professor at USC, her husband, Kip Thorne, a professor at Caltech, Poulter and his wife.

Saul Winstein was the greatest physical organic chemist of his generation. The lecture, an annual event sponsored by the Winstein family and UCLA through the Winstein Chair, Professor Kendall N. Houk, pays tribute to his achievements by honoring outstanding physical organic chemists, many of whom have strong ties to UCLA.

Donald J. Cram Lecture

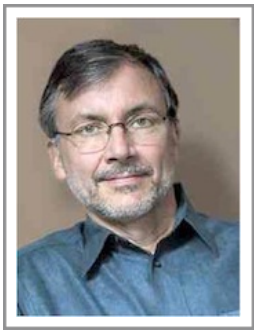
Andrew G. Myers

The second Donald J. Cram Lecture was held on March 15, 2012 in CNSI. Andrew G. Myers, the Amory Houghton Professor of Chemistry at Harvard University, presented a lecture titled "Chemical Synthesis Directed Toward the Discovery of New Medicines for the Treatment of Human Disease."

Professor Myers' research program involves the synthesis and study of complex molecules of importance in biology and human medicine. Myers began his independent academic career at Caltech (1986), where he was Assistant, Associate, and then Full Professor (1994). In 1998, he moved to the Department of Chemistry and Chemical Biology at Harvard University, where he served as Chair of the Department from 2007-2010.

Donald J. Cram was a Nobel Prize-winning chemist who taught and conducted research at UCLA for more than 50 years. An endowment was established in his memory and it began sponsoring departmental events in 2002. The first of these was the "50 Years of Cram's Rule" symposium. This was followed by the Cram Debate in 2003 and the Cram Colloquy in 2005. The Donald Cram lectures began after Patrick Harran, the first Cram Chair, arrived at UCLA. The inaugural event hosted Professor Francois Diederich (ETH- Zurich, UCLA) in November 2010.

Daniel Kivelson Lecture



Eric J. Heller

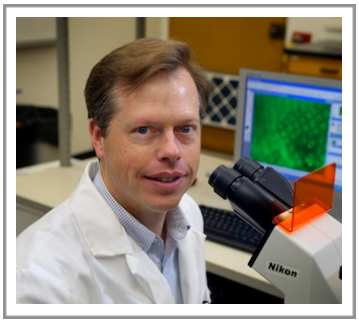
Eric J. Heller, Professor of Physics and Abbot and James Lawrence Professor of Chemistry, Harvard University, presented the 10th Annual Daniel Kivelson Lecture on March 19, 2012 in Young Hall. Heller's lecture, titled "Towards a Deeper Understanding of Tunneling," examined the concept of tunneling in quantum mechanics.

Heller, a member of our department from 1975-83, is well-known for pioneering the time-dependent wavepacket "picture" of quantum mechanics that provides much of our modern understanding of molecular spectroscopy, photochemistry, quantum chaos, and semiclassical approaches to scattering theory, chemical reactions and electron dynamics. On his visit, he gave a guest lecture in the Chemistry 215B graduate quantum course on "Quantum Corrals."

The Kivelson Lecture series was established in 2002 to honor Daniel Kivelson, who was an active faculty member even after his retirement, pursuing research in the area of liquid state dynamics and the theory of the glass transition. The idea was to bring friends and collaborators of Daniel's to the department on an annual basis. Unfortunately, Daniel became seriously ill just months before the first lecture (January 6, 2003), and was unable to attend; he passed away weeks later, on January 23, 2003. The lecture series now continues in his honor.

RESEARCH

Tom Mason Unlocks Mystery of How "Handedness" Arises



Thomas G. Mason

The overwhelming majority of proteins and other functional molecules in our bodies display a striking molecular characteristic: They can exist in two distinct forms that are mirror images of each other, like your right hand and left hand.

Surprisingly, each of our bodies prefers only one of these molecular forms.

This mirror-image phenomenon — known as chirality or "handedness" — has captured the imagination of a UCLA research group led by Professor **Thomas G. Mason**.

Mason has been exploring how and why chirality arises, and his newest findings on the physical origins of the phenomenon were published May 1 in the journal *Nature Communications*.

"Objects like our hands are chiral, while objects like regular triangles are achiral, meaning they don't have a handedness to them," said Mason, the senior author of the study. "Achiral objects can be easily superimposed on top of one another."

Why many of the important functional molecules in our bodies almost always occur in just one chiral form when they could potentially exist in either is a mystery that has confounded researchers for years.

"Our bodies contain important molecules like proteins that overwhelmingly have one type of chirality," Mason said. "The other chiral form is essentially not found. I find that fascinating. We asked, 'Could this biological preference of a particular chirality possibly have a physical origin?'"

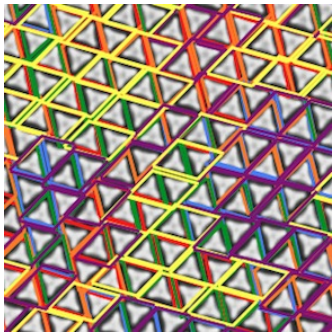
In addressing this question, Mason and his team sought to discover how chirality occurs in the first place. Their findings offer new insights into how the phenomenon can arise spontaneously, even with achiral building-blocks.

Mason and his colleagues used a manufacturing technique called lithography, which is the basis for making computer chips, to make millions of microscale particles in the shape of achiral triangles. In the past, Mason has used this technique to "print" particles in a wide variety of shapes, and even in the form of letters of the alphabet.

Using optical microscopy, the researchers then studied very dense systems of these lithographic triangular particles. To their surprise, they discovered that the achiral triangles spontaneously arranged themselves to form two-triangle "super-structures," with each super-structure exhibiting a particular chirality.

In the top right image that accompanies this article, the colored outlines in the field of triangles indicate chiral super-structures having particular orientations.

So what is causing this phenomenon to occur? Entropy, says Mason. His group has shown for the first time that chiral structures can originate from physical entropic forces acting on uniform achiral particles.



Achiral triangles form chiral super-structures

"It's quite bizarre," Mason said. "You're starting with achiral components — triangles — which undergo Brownian motion and you end up with the spontaneous formation of super-structures that have a handedness or chirality. I would never have anticipated that in a million years."

Entropy is usually thought of as a disordering force, but that doesn't capture its subtler aspects. In this case, when the triangular particles are diffusing and interacting at very high densities on a flat surface, each particle can actually maximize its "wiggle room" by becoming partially ordered into a liquid crystal (a phase of matter between a liquid and a solid) made out of chiral super-structures of triangles.

"We discovered that just two physical ingredients — entropy and particle shape — are enough to cause chirality to appear spontaneously in dense systems," Mason said. "In my 25 years of doing research, I never thought that I would see chirality occur in a system of achiral objects driven by entropic forces."

As for the future of this research, Mason said he and his co-workers were "very interested to see what happens with other shapes and if we can eventually control the chiral formations that we see occurring here spontaneously."

"To me, it's intriguing, because I think about the chiral preference in biology," Mason added. "How did this chiral preference happen? What are the minimum ingredients for that to occur? We're learning some new physical rules, but the story in biology is far from complete. We have added another chapter to the story, and I'm amazed by these findings."

To learn more, a message board accompanies the publication in *Nature Communications*, an online journal, as a forum for interactive discussion.

This research was funded by the University of California. Kun Zhao, a postdoctoral researcher in Mason's laboratory, made many key contributions, including fabricating the triangle particles, creating the two-dimensional system of particles, performing the optical microscopy experiments, carrying out extensive particle-tracking analysis and interpreting the results.

Along with Mason, co-author Robijn Bruinsma, a UCLA professor of theoretical physics, contributed to the understanding of the chiral symmetry breaking and the liquid crystal phases.

Source: UCLA Newsroom

RESEARCH

Steve Clarke Puzzles Over Discovery that Tiny Amounts of Alcohol Dramatically Extend a Worm's Life

A team led by Biochemistry Professor **Steven G. Clarke** reported that minuscule amounts of ethanol, the type of alcohol found in alcoholic beverages, can more than double the life span of a tiny worm known as Caenorhabditis elegans, which is used frequently as a model in aging studies.

"This finding floored us — it's shocking," said Clarke about his discovery, which was published January 18, 2012 in the online journal PLoS ONE, a publication of the Public Library of Science.

In humans, alcohol consumption is generally harmful, Clarke said, and if the worms are given much higher concentrations of ethanol, they experience harmful neurological effects and die, other research has shown.

"We used far lower levels, where it may be beneficial," said Clarke, who studies the biochemistry of aging. The worms, which grow from an egg to an adult in just a few days, are found throughout the world in soil, where they eat bacteria. Clarke's research team — Paola Castro, Shilpi Khare and Brian Young — studied thousands of these worms during the first hours of their lives, while they were still in a larval stage. The worms normally live for about 15 days and can survive with nothing to eat for roughly 10 to 12 days.

"Our finding is that tiny amounts of ethanol can make them survive 20 to 40 days," Clarke said.

Initially, Clarke's laboratory intended to test the effect of cholesterol on the worms. "Cholesterol is crucial for humans," Clarke said. "We need it in our membranes, but it can be dangerous in our bloodstream."

The scientists fed the worms cholesterol, and the worms lived longer, apparently due to the cholesterol. They had dissolved the cholesterol in ethanol, often used as a solvent, which they diluted 1,000-fold.

"It's just a solvent, but it turns out the solvent was having the longevity effect," Clarke said. "The cholesterol did nothing. We found that not only does ethanol work at a 1-to-1,000 dilution, it works at a 1-to-20,000 dilution. That tiny bit shouldn't have made any difference, but it turns out it can be so beneficial."

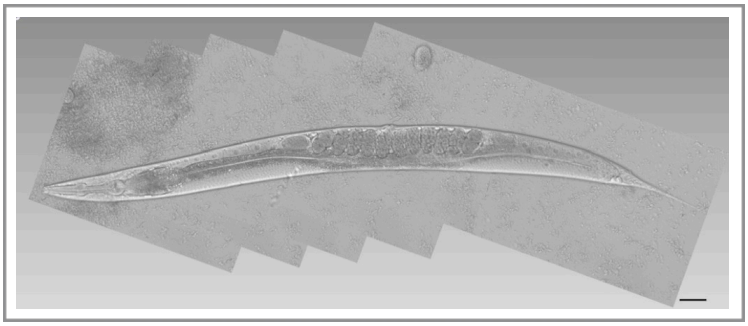
How little ethanol is that?

"The concentrations correspond to a tablespoon of ethanol in a bathtub full of water or the alcohol in one beer diluted into a hundred gallons of water," Clarke said.

Why would such little ethanol have such an effect on longevity?

"We don't know all the answers," Clarke acknowledged. "It's possible there is a trivial explanation, but I don't think that's the case. We know that if we increase the ethanol concentration, they do not live longer. This extremely low level is the maximum that is beneficial for them."

The scientists found that when they raised the ethanol level by a factor of 80, it did not increase the life span of the worms.



The worm C. elegans

The research raises, but does not answer, the question of whether tiny amounts of ethanol can be helpful for human health. Whether this mechanism has something in common with findings that moderate alcohol consumption in humans may have a cardiovascular health benefit is unknown, but Clarke said the possibilities are intriguing.

In follow-up research, Clarke's laboratory is trying to identify the mechanism that extends the worms' life span.

About half the genes in the worms have human counterparts, Clarke said, so if the researchers can identify a gene that extends the life of the worm, that may have implications for human aging.

"It is important for other scientists to know that such a low concentration of the widely used solvent ethanol can have such a big effect in C. elegans," said lead author Paola Castro, who conducted the research as an undergraduate in Clarke's laboratory before earning a bachelor's degree in biochemistry from UCLA in 2010 and joining the Ph.D. program in bioengineering at UC Santa Cruz. "What is even more interesting is the fact that the worms are in a stressed developmental stage. At high magnifications under the microscope, it was amazing to see how the worms given a little ethanol looked significantly more robust than worms not given ethanol."

"While the physiological effects of high alcohol consumption have been established to be detrimental in humans, current research shows that low to moderate alcohol consumption, equivalent to one or two glasses of wine or beer a day, results in a reduction in cardiovascular disease and increased longevity," said co-author Shilpi Khare, a former Ph.D. student in UCLA's biochemistry and molecular biology program who is now a postdoctoral fellow at the Genomics Institute of the Novartis Research Foundation in San Diego.

"While these benefits are fascinating, our understanding of the underlying biochemistry involved in these processes remains in its infancy.

"We show that very low doses of ethanol can be a worm 'lifesaver' under starvation stress conditions," Khare added. "While the mechanism of action is still not clearly understood, our evidence indicates that these 1 millimeter–long roundworms could be utilizing ethanol directly as a precursor for biosynthesis of high-energy metabolic (continued on p. 17)

RESEARCH/IN MEMORIAM

Stopping Cancer Cells From Proliferating

(continued from p. 1)

perhaps, be given in lower doses.

The study was funded in part by the National Institutes of Health, Genentech, the Leukemia and Lymphoma Society, and the V Foundation for Cancer Research.

Source: UCLA Newsroom

Physical Chemistry Seminar Series

(continued from p. 13)

partners – a perfect match to the late Dick Bernstein's research interests. Her lecture was titled, "Dynamical Outcomes of Quenching: Reflections on a Conical Intersection."

Alcohol Extends Worm's Life (continued from p. 16)

intermediates or indirectly as a signal to extend life span. These findings could potentially aid researchers in determining how human physiology is altered to induce cardio-protective and other beneficial effects in response to low alcohol consumption."

Clarke's laboratory identified the first protein-repair enzyme in the early 1980s, and his research has shown that repairing proteins is important to cells. In the current study, the biochemists reported that life span is significantly reduced under stress conditions in larval worms that lack this repair enzyme. (More than 150 enzymes are involved in repairing DNA damage, and about a dozen protein-repair enzymes have been identified.)

"Our molecules live for only weeks or months," Clarke said. "If we want to live long lives, we have to outlive our molecules. The way we do that is with enzymes that repair our DNA — and with proteins, a combination of replacement and repair."

Researcher Brian Young, now an M.D./Ph.D. student at the David Geffen School of Medicine at UCLA, is a co-author on the research.

The research was federally funded by the National Institutes of Health's National Institute of General Medical Sciences.

Source: UCLA Newsroom

Harold Varmus (continued from p. 7)

and global health. He has served as an advisor to the Federal government, and to various pharmaceutical and biotechnology firms and academic institutions.

President Obama appointed him as a co-chair of the President's Council of Advisors on Science and Technology, and he has either chaired or served as a member of several influential committees and boards, including the Board of Directors of the Public Library of Science and the Scientific Board of the Grand Challenges in Global Health at the Bill and Melinda Gates Foundation.

He has also been a member of the U.S. National Academy of Sciences since 1984 and of the Institute of Medicine since 1991. President Obama nominated him as Director of the National Cancer Institute in 2010.

Source: National Institutes of Health, National Cancer Institute, and The Nobel Foundation

In Memoriam

Merle A. Battiste B.S. '54 (Citadel), M.S. '56 (Louisiana State), Ph.D. '59 (Columbia), postdoc '60-'61 UCLA (Winstein), died August 8, 2009, aged 76. After a short stint in the Army, he joined the faculty at the University of Florida, where he was a professor of organic chemistry for 42 years. Battiste's research focused on the synthesis of novel molecular structures, and he authored more than 100 publications. He was a Sloan Fellow, a Fulbright Research Scholar, and an Erskine Fellow.

Bruce F. Day B.S. '44, Ph.D. '49, a former Donald Cram student, Day died on September 14th, 2011, at age 89, after a year's struggle with pulmonary fibrosis. He took pride in his UCLA education, and worked at the DuPont company in Wilmington, Delaware for 30 years, retiring in 1980. He is survived by his two sons, Jonathan and Michael, and his two grandchildren, Jeremy and Julian.

Elliott Eklund Ph.D. '91 UCLA (Williams), died February 16, 2010, aged 48, in a snowboarding accident. He was employed for 16 years at Xerox in Webster, N.Y., working on print head technology. He also held 19 patents.

Hillel Fierer Trustee of our department's Dolores Cannon Southam Award, died December 13, 2009, aged 80. Dolores ("Dolly") Cannon's first cousin was Marjory Fierer, Hillel's wife. Fierer became the trustee after Dolly's mother Fay Cannon died. He attended eight of the past 12 graduation ceremonies to present the award. The successor trustee is Robin Fierer Genchel, his daughter.

Robert E. Gilman B.S. (Dartmouth); Ph.D. (Michigan); postdoc '70-'71 UCLA (Cram), died February 2, 2010, aged 78. Gilman served on the chemistry faculty, first at Williams College and then at Rochester Institute of Technology. While an NSF Fellow at UCLA with Don Cram, he so enjoyed Southern California that he later retired to Los Angeles. An arts lover, he served five years on the LA Opera League Board and was a volunteer staff member at Long Beach Opera.

IN MEMORIAM

Herbert D. Kaesz (1933-2012)

Herbert D. Kaesz

Professor Emeritus Herbert D. Kaesz, a member of our faculty for over 50 years, died of cancer on February 26, 2012. Kaesz was born in Alexandria, Egypt to Austrian parents. His father, a chemist, was asked to join his wife's family business, Kurz Optical, to run the branch in Alexandria. The family then immigrated to the U.S. when Kaesz was 7.

After receiving his B.S. from NYU, Kaesz went on to graduate studies at Harvard University, receiving his Ph.D. in 1959 under the mentorship of F. Gordon A. Stone, and joined our faculty in 1960 as a member of the inorganic division. He retired in 2003, but remained an active emeritus right up until his death.

His research focus was in the synthesis and applications of organometallic compounds, with a particular interest in metal carbonyls. Kaesz was one of the first to accomplish the synthesis of a technetium carbonyl complex, one of the last such complexes to be discovered. Later in his career, he pioneered the development of pyrolytic and photolytic methods of metal film deposition for electronic applications.

Kaesz was also a dedicated teacher. His principal teaching assignments were in chemistry for non-majors, general chemistry, structural inorganic and organometallic chemistry. Since his retirement, he developed and taught a popular "Fiat Lux" seminar for non-majors entitled "Serendipity in Science."

Kaesz performed vital service for the chemistry community. He was Chairman of the IUPAC Commission on the Nomenclature of Inorganic Chemistry, and was involved in the naming of Seaborgium. In addition, he was president of the Inorganic Syntheses Organization, which publishes the Inorganic Syntheses book series (Kaesz served as editor of volume 26 in this series) and served for over 30 years as Associate Editor of the American Chemical Society journal *Inorganic Chemistry*.

Kaesz's accomplishments were honored by the scientific community many times over the course of his career. In 1980, he received the Tolman Medal from the Southern California Section of the ACS and in 1981 he was elected a Fellow of the American Association for the Advancement of Science. In 1988, he received a Senior U.S. Scientist Award from the Alexander von Humboldt Foundation in Germany. In 1998, Kaesz received the ACS Award for Distinguished Service in the Advancement of Inorganic Chemistry. In 2009, he was elected a Fellow of the ACS in the inaugural year of that program.

Professor Kaesz leaves behind a life truly well-lived. He loved UCLA as much as he did his family and friends; his distinguished teaching career, research and achievements at the university were a source of pride for him to the end of his life, as was his involvement with ACS, the Phi Beta Kappa Chapter at UCLA and the UCLA Emeriti Association Executive Board.

Kaesz was passionate and vastly knowledgeable not only about chemistry and science, but also about many different topics, including music, art, history, literature, foreign cultures, languages and movies. He will be remembered for his intellect, optimism, good nature, spirit and wit. He was a true romantic and never stopped loving his dear wife of 51 years, Joan Shenk Kaesz, who sadly passed away in January 2010. He will be sorely missed by his daughters Judy Kaesz Murray and Susan Kaesz, and by his grandchildren Dylan Kaesz, Erin Murray and James Murray.

A memorial service to celebrate Herb Kaesz's life was held on March 21, 2012 in the UCLA Faculty Center and was attended by his family, friends and many faculty members.

Edwin S. Gould B.S. '46 (CalTech), Ph.D. '50 UCLA (McCullough), died October 11, 2011, aged 85. After receiving his doctorate, he worked at Polytechnic University of New York, UC Berkeley, and San Francisco State University before joining the chemistry faculty at Kent State University in 1967. He retired after 44 years in 2011. In addition to writing 213 research papers, largely on inorganic reaction mechanisms, he wrote two graduate-level textbooks that have been translated into five foreign languages. Outside chemistry, Ed was a talented violinist and violist, playing chamber music around the country. He was also a gifted poet.

Edward F. Levy B.S. '42 (Minnesota), Ph.D. '46 UCLA (Winstein), died November 28, 2009, aged 89. From 1947 to 1974 Levy was a senior chemist at Gillette in Boston. Then, after two years at W. R. Grace, he joined Block Drug in Jersey City, NJ, remaining there until retiring in 1987. Levy served as chairman of the New England Society of Cosmetic Chemists in 1977. He also served as a volunteer for the International Service Corps in St.Vincent Island & the Grenadines in 1990.

Walter Lwowski Ph.D. '55 (Heidelberg), postdoc '55-'57 UCLA (Cram), died April 19, 2010, aged 81. After his two years with Cram, he worked three years with R. B. Woodward at Harvard on the total synthesis of chlorophyll. He then joined the chemistry faculty at Yale for six years before going to New Mexico State University in 1966. Here he helped develop a graduate program in organic chemistry. Lwowski retired as professor emeritus in 1991, but continued to help with the department's instrumentation program until his death.

In Memoriam/Calendar

Henry W. Offen B.A. '58 (St. Olaf), Ph.D. '63 UCLA (McMillan), died April 25, 2010, aged 72. Born in Germany, he came to the United States in 1953, and, after receiving his Ph.D., joined the Department of Chemistry at UC Santa Barbara, where he authored or co-authored many papers in the field of high-pressure spectroscopy. Offen served as associate dean of the graduate division and as director of the Marine Science Institute and the Natural Land and Water Reserve System. He retired in 1994, but continued to teach in the Freshman Honors Program until early 2010.

Russell Reed, Jr. B.S., Ph.D. '46 UCLA (Jacobs), died April 8, 2009, aged 86. Reed worked as a chemist at Rocket Power in Arizona, at Thiokol Inc. in Utah, and at the China Lake Naval Weapons Center, where he worked for 35 years and attained the title of senior research chemist in the Aerothermochemistry Division. He authored more than 100 publications and a similar number of patents. He was awarded a Senior Fellowship at China Lake and also received the William B. McLean Award. He retired at 77. For the last nine years of his life, he lived with his family in Santa Barbara.

Bruce R. Rickborn B.A. '56 (UC Riverside), Ph.D. '60 UCLA (Cram), died April 27, 2010, aged 75. After receiving his doctorate, he served a two-year appointment as a visiting assistant professor at UC Berkeley before joining the faculty at UC Santa Barbara. Rickborn's organic chemistry research emphasized the chemistry of epoxides, isobenzofurans, and related materials. At UC Santa Barbara, he served as associate provost in the College of Creative Studies and as Dean of the College of Letters and Science before retiring in 2001.

Bertram I. Rowland B.S. UCLA '50, Ph.D. '54 (Washington), died October 8, 2010, aged 80. After postdoctoral research at Harvard, he attended Stanford Law School before earning a J.D. from George Washington in 1961. He worked for DuPont and Chevron before becoming a partner in a number of law firms. He wrote and prosecuted more than 500 patents. Rowland had a lifelong love of mountains and climbed Mount Kilimanjaro at age 70.

2012 Upcoming Events
in the Department of Chemistry & Biochemistry

June 16 — **Department Graduation Ceremony and Awarding of First Annual Departmental Alumni Award to Astronaut Anna Fisher**
June 16, 2012 (Reception at 4:00 p.m., Ceremony at 5:00 p.m., Court of Sciences)

Oct. 6 — **Celebration of the 100th Birthday of Saul Winstein**
October 6, 2012 (CNSI, 10:00 a.m.-5:00 p.m., Reception and Banquet, UCLA Faculty Center, 5:00 p.m.-10:00 p.m.)

Nov. TBA — **Annual Department Awards Ceremony**
Contact Chair's Office for Date, Time and Location Info: 310-825-3958)

Nov. 5 — **Scott Lecture, Presented by Professor Daan Frenkel, University of Cambridge, England**
November 5, 2012 (Contact Physical Divisional Office for Time and Location Info: 310-206-4956)

Dec. 7 — **Seaborg Symposium & Medal Award Banquet Honoring Harold Varmus**
December 7, 2012 (CNSI Auditorium, Covel Commons, Time TBA)

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HONORING
Harold Varmus
1989 Nobel Laureate in Physiology or Medicine (with Michael Bishop), Director of the National Cancer Institute

SEABORG 2012

December 7, 2012

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