



Carlos Bustamante

Berkeley Labs Photo Dept.

Bustamante and Fleming Win American Physical Society Prizes

Research in chemistry often focuses on objects that are so small and processes that happen so quickly that only very powerful tools can see them and observe their behavior. The American Physical Society has bestowed high honors on two College of Chemistry faculty members who study chemical processes on very small scales.

Carlos Bustamante has been awarded the Biological Physics Prize, and **Graham Fleming** has received the 2002 Earle K. Plyler Prize for Molecular Spectroscopy. In its November announcement, the society cited Bustamante's "pioneering work in single molecule biophysics and the elucidation of the forces involved in DNA replication and transcription." Fleming's award recognizes his "seminal work on chemical reaction dynamics in

liquids and the dynamics of fundamental biological processes using femtosecond laser spectroscopy."

Bustamante uses novel methods to visualize and manipulate single molecules. He studies the mechanical properties of proteins and nucleic acids, including the structural basis of protein-DNA interactions and the mechanics of DNA-binding "molecular motors." To this end, he and his colleagues develop a variety of innovative tools and techniques such as optical tweezers, magnetic beads, single-molecule fluorescence, and scanning force microscopy. Their work has led to new insights into such mechanisms as the means by which viruses can inject their DNA into cells, and how genetic expression in cells may be regulated. Bustamante, who was recently cited as

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Graham Fleming

photo by Greg Butera

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Piping Online College Courses to High Schools

by Robert Sanders, Media Relations

As part of a new outreach effort, Berkeley has extended the reach of its Digital Chem 1A program to local high schools. The first to benefit were students in Vallejo High School's advanced placement chemistry class, who on Monday, November 19, "virtually" joined students from UC Berkeley in the class lecture by watching a real-time Webcast of the class. This trial dovetails with a new University of California effort to develop advanced placement high school classes from university courses in areas such as calculus, biology and chemistry.

Alex Pines, a professor of chemistry at UC Berkeley, presented the lecture in Pimentel Auditorium on the Berkeley campus. On the Vallejo end, Thomas Knight, one of the advanced placement chemistry teachers at Vallejo High School, moderated and facilitated viewing of the Webcast by

presenting PowerPoint slides as they were presented at Berkeley.

"This demonstration serves as a model for technologically driven outreach from the UC Berkeley campus to high schools across California," said **Mark Kubinec**, director of Digital Chem 1A and a lecturer in the College of Chemistry. "This also is a prelude to what we hope will become a self-contained program for high school advanced placement classes anywhere in the country."

Digital Chem 1A was developed as a new approach to teaching Chemistry 1A—general, introductory chemistry—at UC Berkeley. Students still attend a traditional lecture, but all notes are available in PowerPoint format. They are also able to view the lecture and related class notes live via the course's Web site and from a searchable digital archive.

College Outreach Programs

Experience Berkeley

Exposing young people to science, expanding their horizons and providing fun are just some of the motivations for the College's outreach programs. "Experience Berkeley" is an intensive, three-day residential program for high school juniors from Los Angeles that serves primarily students from educationally disadvantaged environments who are underrepresented in universities. The participants are able to explore the resources of Berkeley, its faculty, students, facilities and cultural organizations and to experience some of the events that are unique to higher education.

Professors and undergraduates from the College of Chemistry gave lectures and lab tours to a very enthusiastic group during the summer program. The participants watched chemistry demonstrations and crowded the lab bench to get a closer look as Bunsen burners flamed into action. Chemical Engineering Professors **Alexander Katz** and **John Newman** gave well-received lectures, as did Chemistry Professor **Rollie Myers** and **Ahamindra Jain**, a lecturer in the Chemistry department. **Dr. Robert Lamoreaux**, the chemistry course manager, **Lonnie Martin** and **Edmundo Angeles** were integral to the smooth execution of the lectures and tours. The undergraduates who



photo by Monica Jackson-Tribble

took part were **Katherine Hutches**, **Jamie Ellis**, **Carolina Carvalho** and **Oscar Garcia**.

"We were told by the University Admissions Office that the chemistry segments were so successful that they want us to double the number of students for next year's program. We had 200 students participate this summer. Next year we hope to accommodate 400 students," said coordinator **Monica Jackson-Tribble**, Student Affairs Officer in the Undergraduate Office. If you are interested in participating in this rewarding event, please email Monica at monica@collchem.cchem.berkeley.edu.

Girls Just Want to Have Fun—With Chemistry!

Sculpture...photography...tapestries...watercolors...and *chemistry*. These were some of the themes of the nationwide 2001 National Chemistry Week (NCW) celebration, November 4-10, coordinated by the American Chemical Society and its 189 local sections. NCW provided an opportunity for children of all ages to have fun learning about art and chemistry and how they intersect on many levels.

In support of NCW and under the coordination of **Monica Jackson-Tribble**, the College of Chemistry sponsored "Girls Just Want to Have Fun with Chemistry." More than 70 students from Holy Names High, an all-women's high school in Oakland, participated. The guest speaker was the College's very own **Carolina L. Haass-Koffler**, a senior undergraduate in the chemistry department. Carolina has a bachelor's degree in Art Conservation from the Istituto Italiano Arte, Rome, Italy and

*Art can be conserved
through chemistry for
future generations to
appreciate.*

has worked in the field as an art conservationist. She was responsible for conserving artifacts and art objects relating to the creation of Mount Rushmore that are now on display in the Mount Rushmore Museum. Mount Rushmore is one of the largest and most recognizable art projects in the country.

The attendees learned that art conservators are really Jacks (and Jills!) of-all-trades. They need expertise in a variety of fields, including technology, art history, foreign languages and chemistry, as well as considerable skill in the studio arts. Art conservationists use sophisticated analytical techniques and instrumentation including spectroscopy, chromatography, and microscopy to analyze and authenticate artworks and, with careful study and effort,

can conserve artwork that will be appreciated for generations to come.

The *NEWSLETTER OF THE COLLEGE OF CHEMISTRY* at UC Berkeley is published several times each year to support the College's mission of providing excellent teaching, research and public service in the fields of Chemistry and Chemical Engineering.

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College Updates and Noteworthy News

Morton Denn, Professor Emeritus of Chemical Engineering, has been appointed Albert Einstein Professor and director of the Benjamin Levich Institute for Physico-Chemical Hydrodynamics at The City College of the CUNY.

Chemistry Professor **Jean Fréchet** gave the Baker Lectures in Chemistry at Cornell University this fall. This prestigious lecture series attracts some of the world's most distinguished chemists, including numerous Nobel laureates.

Darleane Hoffman, Professor of Chemistry, was awarded an honorary doctorate from the University of Bern, Switzerland. Professor Hoffman delivered lectures at the University of Bern and the Paul Scherrer Institute, Villigen, Switzerland.

Chambers Hughes, a graduate student with Chemistry Professor Dirk Trauner, has received a graduate fellowship from Lilly Research Laboratories. Hughes is working on the total synthesis of biologically active natural products.

Michael Marletta, Professor of Chemistry, received a grant from the Burroughs Wellcome Fund to investigate heme detoxification in *plasmodium* as a strategy to combat malaria.

Daniel Neumark, Professor of Chemistry, received the Bomen-Michelson Award from the Coblentz Society. His award will be presented at the Pittcon conference in New Orleans in March.

Brian Paegel, a graduate student with Professor Richard Mathies, received an ACS Division of Analytical Chemistry fellowship for Summer 2001. Paegel is developing theory, components and reagents for microfabricated electrophoretic devices. He is also designing circuitry for high-throughput DNA sequencing on microfabricated instruments.

Chemical Engineering Professor **David Schaffer** received a \$220,000 grant to study and overcome barriers to gene delivery for the adeno-associated viral vector using directed evolution approaches.

Getting Interested in Marine Bioproducts

The MarBEC Summer Undergraduate Research Fellowship (MSURF) program is now entering its fourth year and aims to encourage careers and post-graduate studies in the marine bioproducts engineering field by linking the adventure and open-ended aspect of marine discovery to the highly detailed engineering research performed in the laboratory. An educational initiative of the Marine Bioproducts Engineering Center (MarBEC), MSURF 2001 spread fifteen undergraduate students from universities nationwide across five sites, including the Center's campuses of University of California, Berkeley and the University of Hawaii at Manoa, as well as the participating corporations Aquasearch, Inc., CP Kelco, and OmegaTech, Inc.

At Berkeley, students worked alongside graduate mentors in the labs of Chemical Engineering Professors **Harvey Blanch**, **Doug Clark** and **Jay Keasling**. Student projects for the ten-week program ranged from the exploration of biochemical properties of marine algae used as a commercial source of DHA, to the characterization of algal producers of xanthophylls, to studies on the optimization of growth conditions for marine extremophiles. Educational field trips to Chiron, Affymetrix and the Monterey Bay Aquarium Research Institute helped to expand the students' perspectives. The UCB MSURF program is under the direction of Professor Keasling and is coordinated by **Stacey Shulman**, MarBEC's Administrative Director. Funding for the MSURF is provided by the National Science Foundation Research Experience for Undergraduate program, California and Hawaii Sea Grants, and the participating corporations listed above.

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one of the country's leading scientists by *Time* magazine, is also Professor of Molecular and Cellular Biology and of Physics and is head of the Advanced Microscopies Department in the Physical Biosciences Division of LBNL. To learn more about his work and mechano-chemistry, visit <http://alice.berkeley.edu>.

Fleming and his colleagues are seeking to provide a molecular-level description of the role of solvents in chemical reactions, which they study on the super-short, femtosecond time scale. A femtosecond is a quadrillionth, 10^{-15} , of a second. Their work has led to major advances in the understanding of both solvent reorganization and photosynthetic processes in plants and bacteria. The light-collection process in photosynthesis is so efficient because it happens too fast for competing processes to compete and the light is therefore not wasted as heat. The dynamics of solvents and the main events of photosynthesis occur so quickly that they could not be seen directly until the femtosecond laser was used. In addition to serving as Professor of Chemistry, Fleming is also Co-Director of the Institute for Bioengineering, Biotechnology and Quantitative Biomedicine (QB3) and Director of the Physical Biosciences Division at LBNL. More about his work with ultra-fast lasers can be found at <http://www.cchem.berkeley.edu/~grfgrp/>.



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Outstanding Staff Awards for the Chemistry Department

In an elegant ceremony, two chemistry department staff members received the 2001 Chancellor's Outstanding Staff Award in October. **Lonnie Martin** was the recipient of an individual award for "serving as a model of the highest level of function among our teaching and administrative staff. His knowledge of chemistry is remarkable and he performs the chemistry demonstrations that help form the practical glue among abstract concepts for undergraduate students," according to Chemistry Professor Alex Pines.

Additionally, **Pamela Wheaton-Taylor**, Payroll Personnel, received a Team Award for her work with staff diversity awareness. Chancellor Robert Berdahl told the honorees, "You are an inspiration to others, not just in your department, but to the whole campus."



photo by Jonathon Bertsch

Chancellor Robert Berdahl congratulates Lonnie Martin (left) for his outstanding job performance.

MARK YOUR CALENDAR

Abbott Lecture, Wednesday, February 20, 11:00 a.m., Pitzer Aud., Latimer Hall. Professor David Evans, Harvard University. "Studies in Organic Synthesis." Sponsored by Abbott Laboratories.

Glenn T. Seaborg Lectures, Dr. Bruno Chaudret, CNRS, Toulouse, France. Friday, March 1, 4:00 p.m., Pitzer Aud., Latimer Hall. "Sigma-bond Complexes of Ruthenium." Friday, March 8, 4:00 p.m., Pitzer Aud., Latimer Hall. "Towards the Control of the Size, Surface, Shape, and Organization of Nanoparticles Prepared by an Organometallic Route." Sponsored by ExxonMobil.

Regents Lectures, Edward M. Scolnick, M.D., President, Merck Research Laboratories. Monday, March 4, 4:00 p.m., 100 Lewis Hall. "Drugs for Mental Illness: Past and Future Directions." Tuesday, March 5, 4:00 p.m., Sibley Aud., Bechtel Engineering Center. "Drug Discovery: Science and Affordability."

"Cupola Era" Alumni Annual Luncheon, Saturday, March 2, from 12:00–2:00 p.m. Heyns Room in The Faculty Club.

Harold S. Johnston Lecture, Tuesday, March 12, 4:00 p.m., Pitzer Aud., Latimer Hall. Professor Yuan T. Lee, Academia Sinica, Taiwan. "Photochemistry of Aromatic Hydrocarbons."