Chemistry and Chemical Biology

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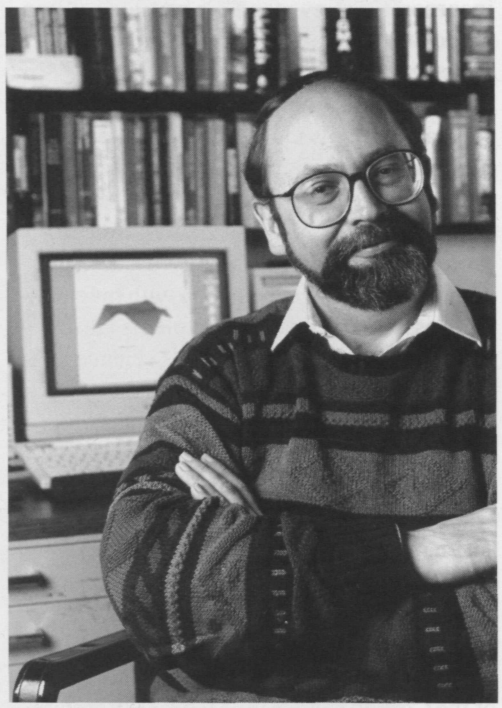
The Chair's Notebook

Past, Present, and Future

As all readers of this newsletter know, the Department of Chemistry—now Chemistry and Chemical Biology—at Cornell has had a distinguished academic reputation for many decades. Among the large number of faculty members whose accomplishments have contributed to that record, Peter Debye must surely be one whose work would be recognized for its fundamental nature and lasting significance. It was consequently a great pleasure for me last fall when I had a chance to meet Peter's grandson Norwig and some of his family and to accept on behalf of the department many of the awards and medals that Peter had received during his career. Foremost among these was the Nobel Prize medal that he received in 1936. To balance the wish for public access to these valuable items with the need for security, it is likely that the original medals will be displayed in one of the libraries. Nevertheless, they are now located on this campus is a fitting tribute to the influence that Cornell had on Peter Debye and that he had on this department.

The tradition of excellence for both research and teaching continues in the present, as exemplified by Paul Houston, who was named a fellow of the American Association for the Advancement of Science and was elected to the American Academy of Arts and Sciences in 2003, and Melissa Hines, who won a Russell Teaching Award for her outstanding contributions to the education of our undergraduates. In addition, Héctor (Tito) Abruña, Frank DiSalvo, and several other faculty members received a $2.25M grant from the U.S. Department of Energy to establish the Cornell Fuel Cell Institute (CFCI). As many readers will know, there has been much recent interest in fuel-cell science and technology, and thus a large number of universities and corporations are investing considerable amounts of money and effort in this area. With the benefit of inside information, let me just suggest that the Cornell version is sufficiently novel and innovative that if CFCI were a startup company, I would recommend a substantial investment! I predict that you will be hearing about exciting results from this collaborative effort.

For the future, three things are necessary to ensure that the department will match or exceed its past and present reputation: outstanding new faculty members, first-class facilities, and visionary leadership. I am happy to report that all three are on the horizon. At the time of this writing, we are still in the hiring process for new faculty, but two spectacular young scientists have already accepted. They are Jón Njarðarson, currently a postdoctoral associate with Sam Danishefsky at the Memorial Sloan-Kettering Cancer Institute, and Garnet Chan, currently a Todd-Croucher Junior Research Fellow at Christ's College Cambridge. They will be joining us this summer.



Barry Carpenter *(Jon Reis Photography)*

Jón obtained his bachelor's degree from the University of Iceland. He then went to Yale for his Ph.D., where he worked with John Wood. He will be conducting research in

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Chemistry Breakfast at the 228th ACS National Meeting in Philadelphia —7:45 am, Tuesday, August 24, Room 107A Pennsylvania Convention Center

Researchers Create Porous Structures That Could Sort Proteins by Size

Bill Steele, Cornell News Service

In recent years chemists and materials scientists have searched enthusiastically for ways to make materials with nanoscale pores—channels comparable in size to organic molecules—that could be used, among other things, to separate proteins by size. Recently Cornell researchers developed a method to "self-assemble" such structures by using organic polymers to guide the formation of ceramic structures.

Now they have advanced another step by incorporating tiny magnetic particles of iron oxide into the walls of porous ceramic structures in a simple "one-pot" self-assembly. Such materials could be used to separate proteins tagged with magnetic materials or in catalytic processes.

"This enables access, for the first time, to protein-separation technology based on a combination of size exclusion with magnetically assisted separation," explains Ulrich Wiesner, professor of materials science at Cornell and lead investigator for the research. One application could be the separation of a single protein out of the thousands found in blood serum.

The new research is described in a paper by Cornell graduate student Carlos Garcia and research associate Yuanming Zhang, Wiesner, and **Francis DiSalvo,** John A. Newman Professor of Chemistry and director of the Cornell Center for Materials Research (CCMR), in the authoritative German journal of chemistry, *Angewandte Chemie.* Wiesner discussed this and other work on self-assembled polymer-ceramic hybrids at the national meeting of the American Chemical Society in New Orleans, March 2003, as part of a symposium on hybrid materials.

Wiesner's team creates porous structures by mixing organic polymers—in particular a class known as diblock copolymers—with silica-type ceramics. Under the right conditions the materials self-assemble into polymer channels surrounded by a polymer-ceramic composite.

This is "calcined," or exposed to extreme heat to vaporize organic components, leaving a ceramic honeycombed with tiny passages. By controlling the polymer molecular weight and the relative amounts of polymer and ceramic, they control the size of the passages. In the latest work, iron ethoxide powder is added to the polymer-ceramic mix. The iron is dispersed throughout the ceramic portion of the structure.

When the material is calcined in the presence of oxygen, the iron transforms into nanoparticles of crystalline iron oxide—in a so-called "lambda" form that has magnetic properties—embedded in the walls of the passages. The researchers note that apparently the surrounding silica-type matrix prevents the iron oxide from converting into a more stable, nonmagnetic "alpha" form under calcination.

X-ray scattering and transmission electron microscopy (TEM) verified that the initial hexagonal cylinder composite structure is preserved under calcination. Measurements with a superconducting magnetometer verified that the nanometer-sized iron oxide particles within the pore walls are superparamagnetic—that is, their magnetic properties can be switched on and off by the application of external magnetic fields. The TEM images show the iron oxide particles to be about 5 nanometers in size (a nanometer is one billionth of a meter), a figure that agrees with theoretical predictions based on magnetometer data.

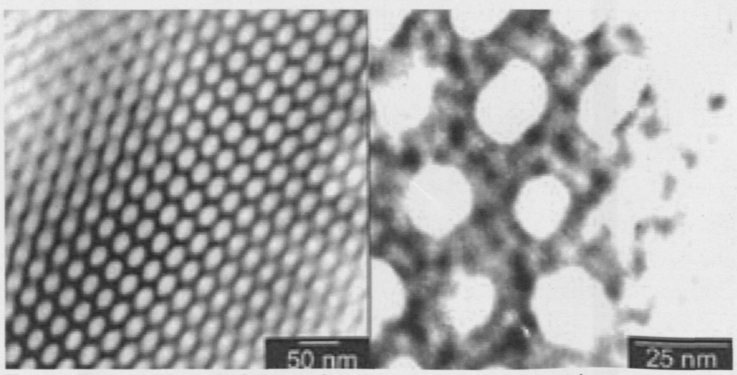
One use for these novel materials, Wiesner suggests, would be to separate proteins or other biological molecules both by size exclusion and magnetic interactions. If a magnetic field is applied to the ceramic structure, molecules tagged with magnetic material would be held back. After other molecules have passed through, the field is turned off and the selected molecule is released.

The porous materials also could be used in catalytic conversion. Iron oxide, for example, is used as a catalyst in converting carbon monoxide to carbon dioxide. In theory, Wiesner says, these materials could be made with a wide variety of metals, making other catalytic processes possible. The material is stable at temperatures up to 800 degrees Celsius (1,472 degrees Fahrenheit), making it usable in many high-temperature catalytic processes.

Other researchers have experimented with adding magnetic particles to a porous ceramic structure after it is formed, by depositing the particles on the inner surfaces of the pores. This risks clogging the pores, Wiesner says.

In the latest experiments, the iron oxide particles are embedded within the ceramic walls. The form of iron oxide created in this process is known as g-Fe2O3. Nonmagnetic a-Fe2O3, with a different arrangement of atoms in the molecule, is usually observed after exposure to the high temperatures of calcination.

The research was supported by the National Science Foundation, Phillip Morris CCMR, which is a Materials Research Science and Engineering Center of the National Science Foundation.



Transmission electron micrographs show, top left, the regular pattern of hexagonal channels in the ceramic material and, at right, the smooth distribution of iron oxide particles (dark spots) within the ceramic matrix. *(Photo courtesy of Wiesner polymer research group)*

Chemist Finds Way to Make Biodegradable Plastic That Mimics Bacteria

David Brand, Cornell News Service

Finding an economical way to make a polyester commonly found in many types of bacteria into a plastic with uses ranging from packaging to biomedical devices is a long-held scientific goal. Such a polymer would be a "green" plastic, in that it would be biodegradable.

Geoffrey Coates, professor of chemistry and chemical biology has partially achieved this goal by discovering a highly efficient chemical route for the synthesis of the polymer, known as poly(beta-hydroxybutyrate) or PHB. The thermoplastic polyester is found widely in nature, particularly in some bacteria, where it is formed as intracellular deposits and used as a storage form of carbon and energy. And yet it shares many of the physical and mechanical properties of petroleum-based polypropylene, with the added benefit of being biodegradable.

Coates reported on his research group's work with PHB in the first of two papers presented at the 225th national meeting of the American Chemical Society in New Orleans, March 2003.

PHB currently is produced through a costly, energy-intensive biological process involving the fermentation of sugar. However, the Coates group's chemical route, once perfected, "is going to be a competitive strategy," the Cornell researcher believes.

Geoff Coates *(Jon Reis Photography)*

To produce the polymer, the process first requires a monomer, in this case a lactone called beta-butyrolactone. This reacts with a zinc complex catalyst, discovered by Coates in the late 1990s, to make PHB.

The problem faced by the Coates group has been that beta-butyrolactone is a "handed" molecule, that is, it has two mirror images, like hands. Polymers produced from a mixture of two-handed forms have very poor properties.

The researchers have been focusing on the development of a new catalyst for the production of the desired single-handed form of beta-butyrolactone, a process called carbonylation. The new catalyst, based on cobalt and aluminum, facilitates the addition of carbon monoxide to propylene oxide, an inexpensive ring compound called an epoxide. By using the commercially available handed form of propylene oxide in the reaction, the corresponding handed form of the lactone can be formed rapidly.

Coates says that "our carbonylation and polymerization processes are, in our opinion, the best." He adds, "A purely chemical route to a polymer that occurs in nature and is easily biodegradable is highly desirable."

Members of the Coates group involved in the research include Ph.D. candidates Yutan Getzler and Lee Rieth and postdoctoral associate Joseph Schmidt. The work was supported by the National Science Foundation, the Arnold and Mabel Beckman Foundation, the David and Lucile Packard Foundation, the Nanobiotechnology Center at Cornell, and the Cornell Center for Materials Research.

Proteomics Symposium Views New Technologies and Their Applications

Roger Segelken, Cornell News Service

Proteomics, a science so new that practitioners are still debating its definition, attracted more than 200 academic and corporate researchers, students, and business representatives to a New York State–wide symposium held in March 2003 in Syracuse.

The New York State Proteomics Symposium, covering promising new technologies and challenging applications, was organized by Cornell; UNYCOR, the Upstate New York Coalition for Biomedical Research; the Business Council of New York State; and Upstate Medical University, where the daylong meeting was held, with additional support coming from NYSTAR, the state's office of science, technology, and academic research.

Fred W. McLafferty speaks March 17, 2003, on characterizing protein structures during the New York State Proteomics Symposium in Syracuse. *(Robert Barker/University Photography)*

When the symposium's first speaker, U.S. Rep. James T. Walsh (R-25th Dist.), admitted he wasn't sure what "proteomics" meant, the plenary speaker supplied two definitions: "Proteomics is the revenge of protein chemists on molecular biologists," said Scott D. Patterson, chief scientific officer at Farmal Biomedicines in Pasadena, Calif.

Speaking on "Proteomics—Too Much of a Good Thing?" Patterson also defined the new science as involving the "analysis of (genes') expression of protein products." Other practitioners, noting that the term proteome was coined to describe the set of proteins encoded by the genome, have said that proteomics means protein biochemistry on an unprecedented, high-throughput scale.

And the high-throughput potential for rapid, more accurate analysis of proteins—particularly with mass spectrometry (MS)—sparked something of a bragging match among symposium speakers. Perhaps topping them all was Jack Henion, professor of diagnostic science in Cornell's College of Veterinary Medicine, who announced a new product from Advion BioSciences, the Ithaca-based company he heads. Henion's new system, marketed by Advion as NanoMate 100, was described as a chip-based array of microscopic electrospray nozzles that mates to 96-well plates of prepared samples for automated, unattended operation with MS and MS/MS analysis.

One secret to his nozzles, the Advion executive said, was their cylindrical shape, allowing them to spray for as long as 40 hours without clogging. SUNY Buffalo chemist Troy D. Wood, who spoke on the topic "Miniaturization of Electrospray—A Driving Force in the Era of Proteomics," said special coatings on his taper-shaped nozzles allows them to spray up to seven hours without clogging.

Among other Cornell-based speakers in the symposium, which was convened by Kelvin H. Lee, assistant professor of chemical engineering, were Klaas van Wijk, assistant professor of plant biology, speaking on "Functional Proteomics of Plastids from Higher Plants Through Prediction and Experimentation"; Fred McLafferty, professor emeritus of chemistry and chemical biology, on "Characterization of Protein Primary Structures by Top Down Mass Spectrometry"; and Dave Schneider of the U.S. Department of Agriculture's Agricultural Research Service laboratory in Ithaca, on "Application of Proteomics to Gene Regulation and Molecular Pathogenesis in *Pseudomonas syringae* PV Tomato DC3000." Schneider, while confessing to be a bioinformatics advocate, noted that "proteomics frees you from charlatans who call themselves bioinformatics experts."

Walsh, who chairs the House of Representatives subcommittee that controls about $122 billion in appropriations to the National Science Foundation, NASA, the Environmental Protection Agency, and other research-funding agencies, said research in proteomics and other basic sciences "is important for our health and the well-being of millions of people around the world." He praised the recently established UNYCOR, saying that "it comes at the right time to share equipment and potential successes, as well as occasional setbacks," among affiliated institutions in upstate New York.

Upstate Medical University president Gregory L. Eastwood, in introducing Walsh, explained that a newly acquired proteomics instrument was centrally located at Upstate Medical for use by all UNYCOR members. In addition to Cornell and Upstate Medical, UNYCOR members include Roswell Park Cancer Institute in Buffalo, Ordway Research Institute in Albany, and the University of Rochester Medical Center.

Researchers Find Long-Sought Method for Fixing Nitrogen

David Brand, Cornell News Service

A research team at Cornell has succeeded in converting nitrogen into ammonia using a long-predicted process that has challenged scientists for decades.

The achievement involves using a zirconium metal complex to add hydrogen atoms to the nitrogen molecule and convert it to ammonia, without the need for high temperatures or high pressure.

"The value of our work is that we have answered the very basic chemical question of how to take this very inert and unreactive [nitrogen] molecule and get it to a useful form," says Paul Chirik, assistant professor of chemistry and chemical biology.

Chirik and his two colleagues reported on the advance in a recent issue of the journal *Nature* (Vol. 427, Feb. 5, 2004). The research team included Chirik's former graduate student Jaime Pool and research assistant Emil Lobkovsky.

In an accompanying "News and Views" in *Nature,* Michael Fryzuk of the University of British Columbia notes that "a remarkable chemical transformation has been discovered that is likely to have important implications for the production of ammonia." However, Chirik emphasizes that his research group has succeeded only in producing ammonia in a laboratory setting, molecule by molecule, and is not making claims for an industrial process. Nitrogen makes up 78 percent of the Earth's atmosphere and, thanks to a 90-year-old industrial process, it can be converted to ammonia-based fertilizer that sustains about 40 percent of the world's population, according to Fryzuk.

The problem with converting—or fixing—nitrogen into a usable, industrial form is that, although the element is a simple molecule, it is held together by an incredibly strong bond between two atoms. Indeed, only carbon monoxide has a stronger bond. But while carbon monoxide adheres easily to other molecules, nitrogen is nonpolar and does not attach easily to metals. It also is hard to put electrons into nitrogen molecules and hard to take them out.

The industrial method for converting nitrogen to ammonia, the Haber-Bosch process (after Fritz Haber and Carl Bosch, both Nobel laureates), produces more than 100 million tons of ammonia annually for the chemical industry and agriculture. The process requires high temperatures and pressure for nitrogen and hydrogen to interact over an iron catalyst.

The Chirik team, however, was able to break the nitrogen molecule's atomic bond, using zirconium in a soluble form, at just 45 degrees Celsius (113 degrees Fahrenheit) and add hydrogen atoms to this so-called "dinitrogen bridge." Complete fixation to ammonia was achieved at 85 degrees Celsius (185 degrees Fahrenheit).

However, Chirik emphasizes that "the chance that anyone will ever replace the Haber-Bosch process is very small." His group's discovery could, he believes, be useful in making "value-added nitrogen chemicals, such as hydrazines for rocket fuels or fine chemicals for drug synthesis or dyes."

Fryzuk notes that it has taken so long to achieve the Chirik group's transformation of nitrogen because, he says, molecular nitrogen "is so chemically inert that even binding it to metal complexes in solution ... was a decades-long challenge for inorganic chemists." Unlike the Haber-Bosch process, the Chirik group's transformation of nitrogen does not use a catalyst. Instead the zirconium makes only one ammonia molecule at a time, not many as in an industrial process, and, as Fryzuk notes, "there is no known homogenous catalyst that can effect this simple process" at low temperatures and pressure. (Instead of acting as a catalyst, the zirconium forms a new complex in which hydrogen atoms are added to the dinitrogen bridge, ultimately forming ammonia.)

Chirik said his group is currently searching for such a catalyst, which would be patentable. "Maybe we can come up with catalytic cycles that don't make ammonia but make other nitrogen compounds. Arguably that would be more important than making ammonia," he says.

The title of the *Nature* article is "Hydrogenation and Cleavage of Dinitrogen to Ammonia with a Zirconium Complex." The research was funded by the National Science Foundation.

Paul Chirik *(Jon Reis Photography)*

DOE Awards Cornell $2.25 Million to Kick-Start Fuel Cell Development

David Brand, Cornell News Service

The U.S. Department of Energy (DOE) has awarded Cornell $2.25 million over three years to establish the Cornell Fuel Cell Institute (CFCI). The institute will research new materials to kick-start the development of fuel cells that would be both efficient and cheap to produce.

The new approach to the electrochemical device, which in its traditional form converts hydrogen and oxygen into water and produces electricity and heat in the process, aims to make a significant improvement in the technology by discovering and exploiting new materials based on recent discoveries in Cornell laboratories. Indeed, some of the possible fuel cell technologies that could result from the research might not even involve hydrogen as a fuel.

Says John A. Newman Professor of Chemistry Francis (Frank) DiSalvo, one of the program's two principal investigators, "It is not often you can see such a close link between the basic research and a potential payoff." DiSalvo is director of the National Science Foundation (NSF)–funded Cornell Center for Materials Research, which manages a group of shared experimental facilities that will provide many of the analytical tools for the fuel cell research.

Some of the research also will take place in two other NSF-funded centers, the Cornell Nanoscale Facility and the Cornell High Energy Synchrotron Source.

The CFCI initially will involve just six Cornell researchers and one from the California Institute of Technology. The DOE funds primarily will support graduate and postdoctoral research.

DiSalvo's co–principal investigator and CFCI director, Héctor (Tito) Abruña, states his conviction that despite the fuel cell's long-heralded promise, the last decade of intensive engineering is nearing limits that can be overcome only with the development of new materials.

"In the past 20 years there has been little materials research aimed at improving fuel cells," says Abruña, professor of chemistry and chemical biology. "Most of the limits that current fuel cells face are in the materials themselves." Adds DiSalvo, "We want to make the materials effective and dirt cheap."

Despite the fact that fuel cell technology has been available for decades, automakers are still a long way from making an affordable, durable, and efficient fuel cell that would begin to wean drivers from petroleum. General Motors, Toyota, and Honda all have ambitious fuel cell programs, but they are at least a decade away from putting the technology into production, the Cornell researchers say.

The most promising technology at present is the polymer electrolyte membrane fuel cell, which uses hydrogen gas as a fuel. One challenge in implementing the technology is the need for more efficient hydrogen generation, since the gas is not available as a resource in its pure state but must be obtained largely from water or hydrocarbons. Hydrogen gas also is difficult to store and distribute.

One potential solution is to attach the fuel cell to a costly device called a reformer, which turns hydrocarbon fuels into hydrogen. But, Abruña points out, it would be more efficient to bypass hydrogen and make direct use of the hydrocarbon or other liquid fuels, such as methanol and ethanol. However, one long-range CFCI goal is to make it possible to use a variety of fuels that also would provide a stepping stone to an eventual hydrogen economy.

"We now have anodes that work pretty well with methanol, which is converted at the anode into carbon dioxide and protons. Instead of throwing away the carbon dioxide, as would happen if a reformer is used, such a fuel cell could produce extra energy from the carbon and so produce a more efficient cell with less carbon dioxide output," said Abruña. (Fuel cells have two electrodes: the anode, the negative post, and the cathode, the positive post.)

CFCI has its origins in the research of Cornell doctoral candidate Sean Smith who, working with Abruña, found that single-crystal platinum, modified by depositing just a few atoms of bismuth on its surface, is much better at oxidizing the simplest fuel—formic acid (the same chemical used by ants)—than is platinum on its own. However, when other fuels are used, platinum loses much of its ability to promote the fuel cell reactions.

Single crystals of platinum can be cut in different ways to expose various arrangements of atoms at the surface, each arrangement enabling a different activity. But fuels other than pure hydrogen produce carbon monoxide, which "poisons" the fuel cell by strongly binding to the surface of the platinum and resulting in dramatic losses in efficiency. Adding ruthenium to the platinum mitigates the poisoning, and the addition of a few atoms of bismuth "mitigates it by an enormous amount," Abruña says.

Indeed, DiSalvo and his colleagues found that a compound of platinum and bismuth is an ideal fuel cell material. It is not an alloy like stainless steel or the platinum-ruthenium that many fuel cells use, but a so-called ordered intermetallic compound in which atoms are very specifically arranged.

"These ordered intermetallic compounds have not been explored for use in fuel cells, so even though platinum-bismuth is quite good, we are searching for other such compounds that should do even better," DiSalvo says. "The team has found several other compounds that also are promising and we expect that in the near future our rate of searching will increase perhaps a thousandfold."

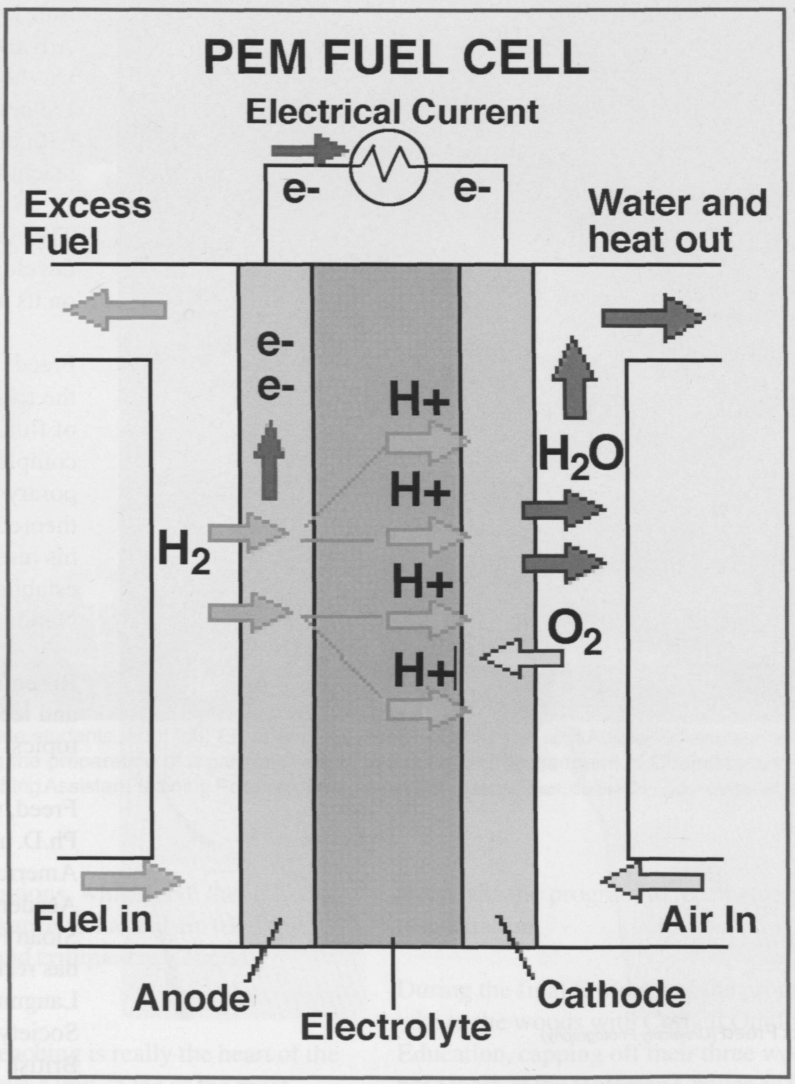
Bruce Van Dover, a Cornell professor of materials science and engineering who is an expert in combinatorial methods (techniques for making and testing many complex metal materials in parallel), will search through thousands of intermetallic compounds to find compositions and structures that are even more attractive as fuel cell electrodes.

Other CFCI researchers will look at new synthetic materials for the fuel cell's two electrodes and the electrolyte, or membrane, that is placed between them to conduct positively charged ions. In the materials science and engineering department, Associate Professor Ulrich Wiesner will look at "one pot" synthetics, such as flexible ceramics, and Professor Emmanuel Giannelis will investigate composites made from clays and polymers.

The materials produced by the group will be examined both at Cornell and at collaborating companies, including MTI Micro Fuel Cells in Albany, N.Y., which is planning to market a fuel cell that uses methanol as a fuel. CFCI also is discussing partnerships with General Motors Fuel Cell Division, Corning, and Exxon Research.

The Cornell researchers also plan to work with methanol as a fuel but are exploring other possibilities, such as ethanol—obtained from biomass—or other hydrocarbon sources. "Intermetallic compounds in our view have the potential to use ethanol," says Abruña. Barry Carpenter, professor and chair in Chemistry and Chemical Biology, is working with the group to identify other potential fuels that might be used efficiently in fuel cells and with different electrode materials.

Says DiSalvo, "We are not choosing a winner, we are just exploring new materials and what we find might then help decide which technology is going to be the right one."



How a fuel cell works: In the polymer electrolyte membrane (PEM) fuel cell, also known as a proton-exchange membrane cell, a catalyst in the anode separates hydrogen atoms into protons and electrons. The membrane in the center transports the protons to the cathode, leaving the electrons behind. The electrons flow through a circuit to the cathode, forming an electric current to do useful work. In the cathode, another catalyst helps the electrons, hydrogen nuclei, and oxygen from the air recombine. When the input is pure hydrogen, the exhaust consists of water vapor. In fuel cells using hydrocarbon fuels the exhaust is water and carbon dioxide. Cornell's new research is aimed at finding lighter, cheaper, and more efficient materials for the catalysts and membranes. *Graphic adapted from U.S. Dept. of Energy.*

International Symposium Honors Jack Freed

David Brand, Cornell News Service

Jack Freed *(University Photography)*

Jack Freed, director of the National Biomedical Center for Advanced ESR Technology (ACERT), at Cornell University, was honored at an international symposium in Baker Laboratory on April 26, 2003. The event celebrated Freed's 65th birthday and his 40 years devoted to research and teaching at Cornell.

The symposium, "ESR, New Developments," highlighted new developments in electron spin resonance (ESR), with emphasis on its applications to biophysical and biomedical research.

Freed is internationally recognized as a pioneer in bringing to the forefront techniques for the study of molecular properties of fluids and of biosystems, including the structure and complex dynamics of proteins and membranes. Many contemporary applications of ESR would not be possible without the theoretical and simulation methods developed by Freed and his research group. He became director of ACERT when it was established in 2001 with a grant of nearly $6 million from the National Institutes of Health.

Researchers from around the world attended the symposium, and lectures spanned a wide range of biophysical and related topics.

Freed, who joined the Cornell faculty in 1963, obtained his Ph.D. at Columbia University in 1962. He is a fellow of the American Physical Society (APS) and of the American Academy of Arts and Sciences. He has been an Alfred P. Sloan Foundation and a John Simon Guggenheim fellow. Freed has received a number of awards including the APS Irving Langmuir Prize in Chemical Physics, the American Chemical Society's Buck-Whitney Award, the Bruker Award of the British Chemical Society, and the International Zavoisky Prize.

Upstate/Downstate: Chemical Biologists Train in "Crown Jewel" Program of Two-City Collaboration

By Kate Becker

When the first-year graduate students in a training program in chemical biology stepped onto the Cornell campus for the first time in 2001, they didn't have the comfort of talking with veterans who had been through it all before.

That's because these eight students were the inaugural class of the Tri-Institutional Training Program in Chemical Biology (TPCB), an innovative collaboration between Cornell in Ithaca and Weill Cornell Medical College, Rockefeller University and the Memorial Sloan-Kettering Cancer Center in New York City.

A branch of the institutions' multifaceted Tri-Institutional Research Program (TIRP), the TPCB aims to stimulate research at the interface between chemistry and biology. Founded with an anonymous $80 million gift in 2000, the TIRP also operates research programs in computational biology and cancer and developmental biology. A new graduate training program in computational biology, modeled on the TPCB, welcomed its first class last fall

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Chemistry Training Program Gives TAs at Cornell a Head Start

Lissa Harris, Cornell News Service

Most of them have never seen a classroom from the other side of the podium. But by the time the first day of classes rolls around, teaching assistants in the Department of Chemistry and Chemical Biology already will have a head start on becoming great teachers—thanks to a pioneering Cornell program, now a quarter-century old, designed to help new teaching assistants hit the ground running.

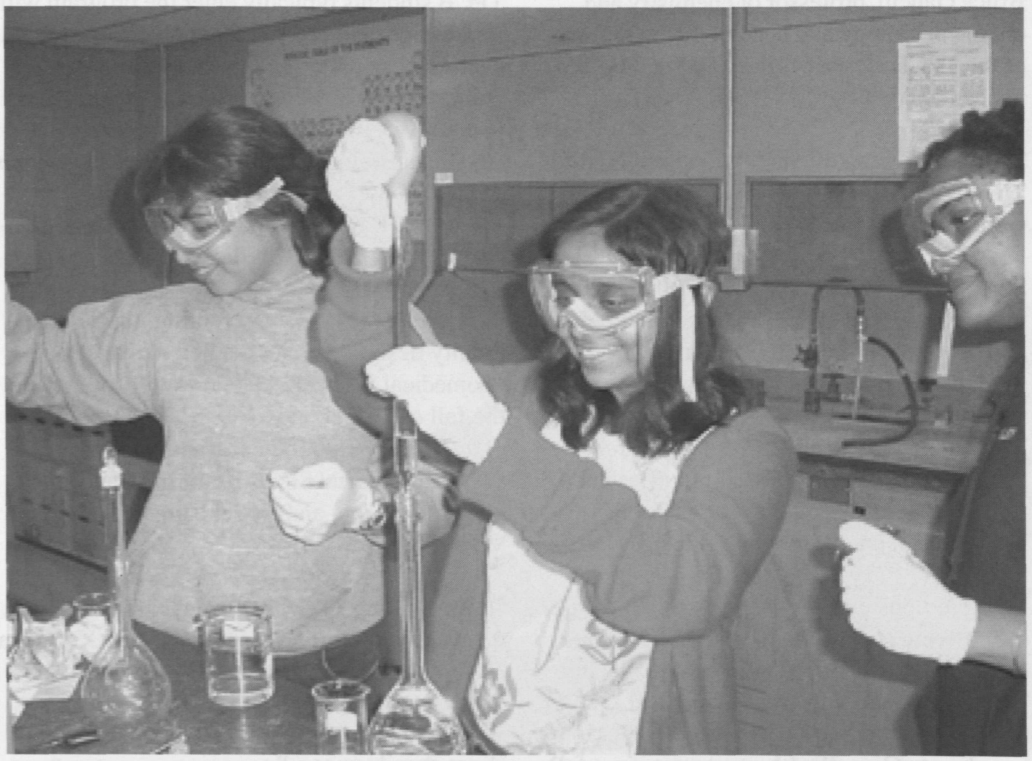
The Teaching Assistant Training Program (TATP) was begun in 1979, in part to address chronic student complaints about the poor quality of teaching assistants in the chemistry department. Concerned about the complaints, director of introductory laboratories Stanley Marcus (now retired) obtained a grant from the Exxon Foundation to train incoming graduate students in effective teaching techniques. The resulting program was a resounding success, and it is still going strong.

While other departments hold workshops and training sessions to prepare teaching assistants for the classroom, most last only a few afternoons. The chemistry and chemical biology department's program lasts a full three weeks and gives the incoming class an opportunity not only to develop effective teaching skills but to form friendships and work closely as a team.

Incoming graduate students are not required to take the three-week program, but most do, aided by a stipend from the College of Arts and Sciences. In 2003, 31 Cornell graduate students, who come from universities across the country and around the world to be TAs, participated in the program, which ran from July 14 through August 1.

The graduate students receive training in academic integrity issues, teaching techniques, diversity in the classroom, and web page maintenance. They also try out new labs for general undergraduate chemistry classes.

But the most important item, according to director of undergraduate laboratories and TATP director James Almy, is the "micro-teaching" sessions, which give the incoming students a chance to have their teaching videotaped and critiqued in a friendly atmosphere.



Cornell graduate students, from left, Elizabeth Quevedo, Nabanita De, and Abiola Pollard test an experiment involving the preparation of a galvanic battery cell during the Department of Chemistry and Chemical Biology's Teaching Assistant Training Program. *(Photo courtesy Nancy Munkenbeck, Cornell Chemistry and Chemical Biology)*

"The microteaching is really the heart of the program," says Almy. "One of the most difficult things about being a TA at first is that you're just plain frightened about getting up and talking in front of people." Year after year, he says, incoming graduate students have found that the intensive sessions helped them be more confident and skilled in the classroom.

Safety training, which is required of all students who teach or do research in a chemistry lab, also is on the schedule. Officers from Cornell Environmental Health and Safety spend several days giving the TAs a crash course in dealing with lab fires, toxic spills, powerful lasers, dangerous gases, and more. A representative of the Red Cross also visits the program to teach emergency resuscitation.

During the final few days of the program, TAs take to the woods with Cornell Outdoor Education, capping off their three weeks of hard work at the Hoffman Challenge Course. The graduate students—who have by this time spent many hours helping each other with labs, critiquing each others' teaching skills and just hanging out—now must work together to solve the outdoor team-building puzzles, both on the ground and high in the trees.

"All of this work sends a signal that we, as a department, we as a university, care about teaching," says Almy. "We want to be the major research university that does the best job of undergraduate education in the country."

"Crown Jewel", continued

Bruce Ganem, professor of chemistry and chemical biology and head of the Ithaca arm of the TPCB, describes the training program in chemical biology as TIRP's "crown jewel."

That 2001 inaugural, he says, was "intrepid." The first year was "a huge experiment." "We were troubleshooting as we went."

Students and faculty, for example, had to master New York-to-Ithaca videoconferencing and learn to cut through multi-institutional red tape.

Two years later, those first students are comfortably ensconced in laboratories in New York and Ithaca, and this year's entering class is enjoying a much smoother ride.

Like previous classes, the nine students in the entering class of 2003 spent the summer doing laboratory rotations in New York City. There, they were immersed in medical research and got their fill of urban life before traveling to Cornell's Ithaca campus for a fall semester loaded with graduate-level chemistry courses.

TPCB students typically enter the program with impressive chemistry credentials (most studied chemistry as undergraduates, and all were admitted to the training program through Cornell's Department of Chemistry and Chemical Biology). However, their backgrounds in biology are "a mixed bag," says Timothy Ryan, TPCB director and professor of biochemistry at Weill Cornell Medical College.

To put everyone on even footing, the TPCB faculty designed a class called Advanced Biomedical Sciences, held in New York City in the fall of the second year. The class consists of lectures by TPCB faculty and luminaries such as Memorial Sloan-Kettering Cancer Center president and Nobel laureate Harold Varmus.

"Being young, TPCB has been extraordinarily flexible," says third-year student Jane Xingjuan Chao. "The class was relatively informal, and we were able to have a lot of inspiring discussions with professors and to give suggestions about the class, too."

At the end of the course, says Ryan, students "know what the cutting-edge questions are" and are prepared to begin research at one of the four TIRP institutions. A graduating student receives a degree from the institution at which his or her thesis research is completed.

The research projects chosen by the 2001 entering class, the first to do research full time, illustrates the power of the TPCB to connect researchers who might otherwise never collaborate, said Ryan. He describes third-year student Heather King as a "poster child" for this brand of academic matchmaking. King's interest in the circadian rhythm—the internal clock responsible for everything from blood pressure regulation to jet lag—brought together two prominent researchers who had never before collaborated.

One of them, Rockefeller University Professor Mike Young, studies the genetics of the circadian rhythm. Brian Crane, professor of chemistry and chemical biology at Cornell, studies its molecular basis.

"The student was the one who forged the link," says Ryan.

Jamie Cohen Receives International Precious Metals Institute Student Award and an ACS Fellowship

Jamie Cohen, a graduate student in Professor Abruña's research group has been selected by the Board of Directors of the International Precious Metals Institute (IPMI) to receive its annual student award for her research involving the development of membraneless microfuel cells.

The prize of $3,000 was established to recognize and encourage outstanding work by a graduate or undergraduate student in precious metals research. The award and certificate citing her work will be presented at IPMI's annual meeting in Pheonix, Arizona, in June.

Jamie has also been selected by the American Chemical Society's Division of Analytical Chemistry to receive a summer graduate fellowship. The fellowship, sponsored by Johnson & Johnson Pharmaceutical Research and Development, is awarded to encourage basic research in the field of analytical chemistry, to promote the growth of analytical chemistry in academic institutions and industry, and to provide recognition of future leaders in the field of analytical chemistry.

Eightieth Birthday of Fred McLafferty Celebrated with Symposium

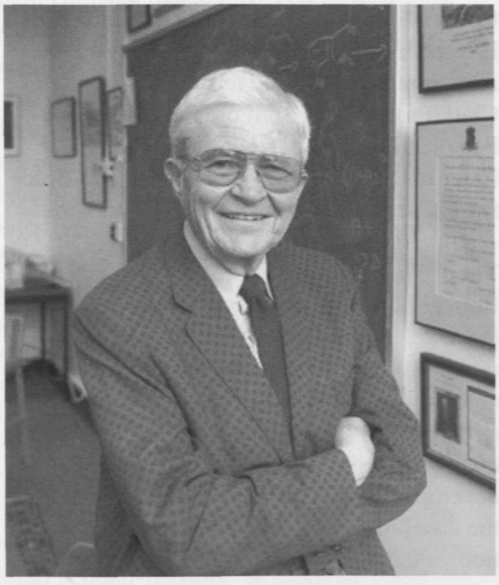
David Brand, Cornell News Service

A scholarly gathering, with visitors from around the world, was held at Cornell, May 10, 2003, to celebrate the 80th birthday of one of the Department of Chemistry and Chemical Biology's most eminent members, Professor Emeritus Fred W. McLafferty.

McLafferty pioneered the development of analytical chemistry techniques in wide use today, including gas and liquid chromatography combined with mass spectrometry. He also was among the first in his field to apply computers to scientific instruments for data acquisition, reduction, and interpretation. An expert in gaseous ion chemistry, McLafferty wrote the standard textbook in the field, *Interpretation of Mass Spectra*. And he continues to maintain an active research program.

Speakers and hosts of the McLafferty Symposium. First row, left to right: Venkataraghavan, Amster, McLafferty, Kelleher, Little. Second row, left to right: Todd, McAdoo, Pesyna, Chait. Third row: Turecek, Baldwin, Williams. Fourth row: Loo, Wesdemiotis. *(Photo courtesy University Photography)*

McLafferty, who in 1991 became the Peter J. W. Debye Professor Emeritus of Chemistry and Chemical Biology, did his graduate studies at Cornell from 1947 to 1950, when



Debye was chair of the chemistry department. After leaving Cornell, McLafferty joined the Spectroscopy Laboratory at Dow Chemical Co., where he established his pioneering group for mass spectrometry and gas chromatography. At Dow, and later at Purdue University, he became a leader in using mass spectrometry to characterize molecular structures. He joined the Cornell chemistry faculty in 1968. He was elected to the National Academy of Sciences in 1982.

Among the symposium speakers were McLafferty's colleagues and former graduate students from his long life of research. They included I. Jonathan Amster of the University of Georgia, Michael Baldwin of the University of California-San Francisco, Ed Chait of PharmaCore, Michael Gross of Washington University at St. Louis, Neil Kelleher of the University of Illinois, Dan Little of HK Pharmaceuticals, David McAdoo of the University of Texas, Gail Pesyna of the Sloan Foundation, Peter Todd of Oak Ridge National Laboratory, Frank Turecek of the University of Washington, Babu Venkataraghavan of the Institute for Advanced Studies, and Evan Williams of the University of California-Berkeley.

The symposium was arranged by committee chair Joseph Loo, University of California at Los Angeles, co-chair Chrys Wesdemiotis, The University of Akron, and committee members Doug Stauffer and Stanton Loh, both from Palisade Corporation.

Barry Carpenter Receives Endowed Chair

Cornell News Service

Barry K. Carpenter was elected the Horace White Professor of Chemistry and Chemical Biology, effective April 1, 2004. The chair is named for the father of Andrew Dickson White, the first president of Cornell.

Carpenter's research focuses on the mechanisms of chemical reactions. His research group, whose approach combines theoretical and experimental techniques, is interested in taking advantage of modern computing power to revisit some of the theories of chemical reactions and to remove some of the approximations that had to be made during the development of those theories in earlier years. "It turns out that some of the approximations did not work as well as people thought, and so we are having to revise some of the ways that we think about how chemical reactions occur," Carpenter says.

"The study of reaction mechanisms is very basic science, but in part because of that, it has applications to widely varying real-world problems," he says.

Carpenter has ongoing collaborations with Fred McLafferty, Peter J. Debye Professor Emeritus of Chemistry and Chemical Biology, on the determination of protein structures by mass spectrometry; with George Hess, professor of biochemistry, on the development of reagents for understanding the action of neurons; and with Hector Abruña, the E. M. Chamot Professor of Chemistry and Chemical Biology, and Frank DiSalvo, the John A. Newman Professor of Chemistry and Chemical Biology, on the development of new fuel cells.

Born in England, Carpenter was educated at Warwick University, where he graduated in 1970 with a B.Sc. in molecular sciences (first class honors). He earned his Ph.D. in organic chemistry at University College, London, in 1973. For the next two years he was a postdoctoral researcher with J. A. Berson at Yale University.

Carpenter joined the Cornell Department of Chemistry in 1975 as an assistant professor, rising to associate professor in 1981 and full professor in 1985.

His many awards include Alfred P. Sloan Foundation and John Simon Guggenheim Memorial Foundation fellowships. He won the Alexander von Humboldt Senior Scientist Award in 1990, the Arthur C. Cope Scholar Award from the American Chemical Society (ACS) in 1997, and the James Flack Norris Award from the ACS in 1999. He also won the Stephen and Margery Russell Teaching Award in 1992. He is a fellow of the American Association for the Advancement of Science.

Carpenter is a member of the editorial advisory boards of *Journal of the American Chemical Society*, *Accounts of Chemical Research*, and *Organic and Biomolecular Chemistry* and is a former associate editor of *Journal of Organic Chemistry*. In addition, he is a consultant for Eastman Kodak and Bristol-Myers Squibb.

Paul Chirik Selected Cottrell Scholar

Paul Chirik, assistant professor, has been selected the recipient of a $75,000 Cottrell Scholar Award for 2004. His research focuses on developing metal compounds that convert unreactive molecules, such as atmospheric nitrogen, into more value-added products, such as ammonia, fuels and fine chemicals. His Cottrell award, offered by Research Corp., a Tucson-based foundation for the advancement of science, will be applied to his research and classroom programs focusing on the application of transition metal chemistry to problems in chemical synthesis.

Paul Chirik and Melissa Hines Receive Faculty Grants

Beth Goelzer Lyons

Cornell's Faculty Innovation in Teaching Grants Program has awarded 18 new grants to help Cornell faculty members use technology to implement creative teaching and learning activities.

Grant recipients are supported with project planning, instructional design, web programming, video production, and other services from Cornell Information Technologies' Distributed Learning Services group, which serves as the overall project coordinator, as well as through partnerships with Cornell University Library, the Center for Learning and Teaching, and technical staff within the colleges and schools.

The program was created in 2001 with substantial support from the Office of the Provost. Through a competitive process, 16 grants are awarded annually by the college and school deans and four by the Faculty Advisory Board on Information Technologies (FABIT). The grants provide support to take the projects from the proposal stage through several stages of development and implementation, depending on their scale. To date, 58 grants have been awarded.

Paul Chirik and Melissa A. Hines will improve interactive learning in large-enrollment introductory chemistry courses by adding in-class polling.

Bruce Ganem Reappointed as J. Thomas Clark Professor of Entrepreneurship and Personal Enterprise

Congratulations to Bruce Ganem, Franz and Elisabeth Roessler Professor, who has been reappointed to his third term as J. Thomas Clark Professor of Entrepreneurship and Personal Enterprise. A letter from President Emeritus Hunter R. Rawlings III praises Bruce for his dedication to the highest standards.

The J. Thomas Clark Professorships of Entrepreneurship and Personal Enterprise are three-year appointments to foster participation in Cornell's university-wide Entrepreneurship and Personal Enterprise Program (EPE) by providing funding for faculty members throughout the university to develop new courses or engage in research in the areas of new business creation, innovation, and development.

Melissa Hines Receives Teaching Award

Melissa Hines, associate professor of chemistry and chemical biology, was selected by the College of Arts and Sciences to receive the 2003 Russell Teaching Award. This award, made possible by a grant from the John M. and Emily B. Clark Fund, acknowledges those who demonstrate their devotion to teaching. Teaching, according to the guidelines, includes classroom presence and its attendant preparation and administration, student counseling including general advising of students formally assigned but not necessarily enrolled in the recipients' courses, and development of new courses and new methods of student instruction.

Paul Houston Elected to American Academy of Arts and Sciences

Paul Houston, Peter J. W. Debye Professor, has been named a fellow of the American Academy of Arts and Sciences.

New fellows and foreign honorary members are nominated and elected by current members of the Academy. Members are divided into five distinct classes: (1) mathematics and physics; (2) biological sciences; (3) social sciences; (4) humanities and arts; and (5) public affairs and business. The unique structure of the American Academy allows members to conduct interdisciplinary studies that draw on the range of academic and intellectual disciplines.

The academy was founded in 1780 by John Adams, James Bowdoin, John Hancock, and other scholar-patriots "to cultivate every art and science which may tend to advance the interest, honor, dignity, and happiness of a free, independent, and virtuous people." The academy has elected as fellows and foreign honorary members the finest minds and most influential leaders from each generation, including George Washington and Ben Franklin in the eighteenth century, Daniel Webster and Ralph Waldo Emerson in the nineteenth, and Albert Einstein and Winston Churchill in the twentieth. The current membership includes more than 150 Nobel laureates and 50 Pulitzer Prize winners. Drawing on the wide-ranging expertise of its membership, the American academy conducts thoughtful, innovative, nonpartisan studies on international security, social policy, education, and the humanities.

Fred McLafferty Receives ASMS Award

Fred W. McLafferty, Peter J. W. Debye Professor Emeritus, was selected by the American Society for Mass Spectrometry to receive the 2003 ASMS Award for a Distinguished Contribution in Mass Spectrometry. The award recognizes a focused, singular achievement in, or contribution to, fundamental or applied mass spectrometry. The award was presented at the 51st ASMS Conference in Montreal to Professor McLafferty for his monumental contribution to the mechanistic definition of the six-membered ring hydrogen rearrangement in the gas-phase ion chemistry of carbonyl compounds, now known as the "McLafferty Rearrangement."

D. Tyler McQuade Selected as a Beckman Young Investigator

The Arnold and Mabel Beckman Foundation is an independent, nonprofit foundation originally established in September 1977 for the purpose of supporting basic scientific research, primarily in the fields of chemistry, biochemistry, and medicine. Dr. and Mrs. Beckman provided funds for the foundation mainly in the form of shares of common stock in Beckman Instruments, Inc. Their original intent was to dispose of all assets of the foundation during their lifetimes.

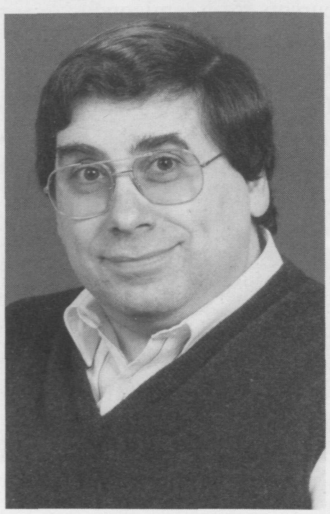
Following Mrs. Beckman's death in June 1989, Dr. Beckman decided to change the nature of the foundation from one with a limited life span to a foundation in perpetuity. The mission of the foundation thus became that of "preserving and enhancing the capital assets and distributing only revenue to support leading-edge research in the fields of chemistry and the life sciences, broadly interpreted, and particularly to foster the invention of methods, instruments and materials that open up new avenues of research and application in these disciplines and related sciences."

Considered among the greatest philanthropists of all times, Dr. and Mrs. Beckman, through the Arnold and Mabel Beckman Foundation, have contributed approximately $350 million to the advancement of research and education. Their gifts have benefited a number of scientific and medical institutions throughout the United States.

Since 1991, the Beckman Foundation has awarded 196 Beckman Young Investigator (BYI) awards totaling $41 million to young scientists who are conducting their research programs at prominent universities and research institutes across the nation. This year they have chosen D. Tyler McQuade to receive this prestigious award.

Steve Russo Receives Distinguished Teaching Award

Senior lecturer Steve Russo has been selected to receive the 2004 John M. and Emily B. Clark Distinguished Teaching Award. The Clark Awards are made possible by a grant from the John M. and Emily B. Clark Fund, recognizing individuals for classroom presence, preparation, administration, student counseling and general advising, development of new courses, and new methods of student instruction.



James Engstrom and Derek Tan Are Named Members of the Field of Chemistry

The department is pleased to announce the addition of James R. Engstrom and Derek S. Tan to the graduate field of chemistry.

James R. Engstrom, associate professor in the School of Chemical and Biomolecular Engineering, received his B.ChE. at the University of Minnesota in 1981 and his Ph.D. from the California Institute of Technology in 1987.

Engstrom is widely recognized for his work concerning molecular beam scattering of thin film precursors from semiconductor surfaces, and fundamental studies of thin film deposition, making use of precisely controlled beams of molecular and/or atomic species, with applications in silicon-based microelectronics, and, more recently, molecular electronics.

Engstrom was granted a leave of absence starting in 1998 to join the technical management team of an exciting start-up firm, Symyx Technologies. Despite a very enjoyable stay at Symyx, he returned in 2001 to his true calling, educating undergraduate and graduate students at Cornell. Due in part to the invaluable experience he gained in industry he is currently establishing a research area for his group that involves work on microchemical systems. The focus is on both fundamentals and applications of these systems in point-of-use chemical production, high-throughput screening, and acceleration of the research and development cycle.

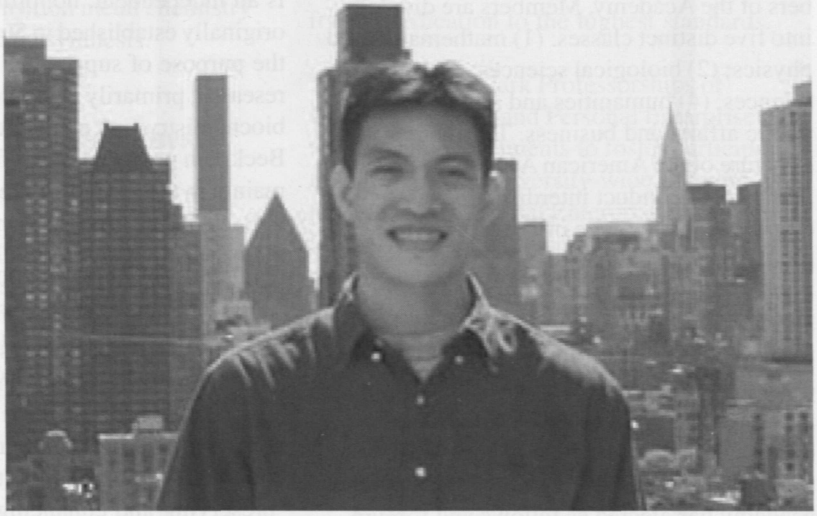
Engstrom has received several awards including the National Science Foundation Presidential Young Investigator Award, a Lilly Endowment Teaching Fellowship, the Cornell University College of Engineering Teaching Award, and a STA Nuclear Fellowship from the Science and Technology Agency of Japan. He also holds 1 patent, and no less than 5 have been filed recently or are in preparation for filing.

Derek S. Tan, assistant professor at the Memorial Sloan-Kettering Cancer Center, received his B.S. from Stanford University in 1995 and his Ph.D. from Harvard University in 2000. After receiving his Ph.D., Tan was very excited about going into academic science, where he could start his own lab and work on more of his own ideas. "Rather than going the industrial route, I liked the flexibility and the freedom you have in academia," he notes. Tan accepted a post-doctoral position with Samuel Danishefsky at Sloan-Kettering Institute. He became a member of the faculty in 2002.

Research in his lab is focused in the area of diversity-oriented organic synthesis. Tan and his group are developing syntheses of broadly diversified libraries of small molecules that incorporate key structural elements of natural products. They hope to use these libraries to identify new small molecule biological probes, particularly for targets for which no structural or mechanistic information is available to guide the design of such molecules. Because the methods developed for target-oriented synthesis of these natural product substructures are often unsuitable or inadequate for diversity-oriented synthesis, the group is developing new synthetic strategies to access these compounds.

The lab's long-term goal is to evaluate the effectiveness of their strategy by synthesizing a number of moderately sized libraries (500–5,000 compounds each) and testing them in a range of high-throughput screens in collaboration with other laboratories in the Tri-Institutional Research Program.

Tan received a Damon Runyon Cancer Research Foundation Postdoctoral Fellowship while at Sloan-Kettering and received the National Defense Science and Engineering Graduate Fellowship and the Roche Graduate Fellowship in Organic Chemistry during his studies at Harvard University.



Gary Davenport Retires After 42 Years of Dedicated Service

Gary Davenport retired on March 19, 2004, after exactly 42 years as an engineering technician in Harold Scheraga's laboratory. Gary joined the lab on March 19, 1962, and immediately began to exhibit his skill in both designing new instruments and maintaining the existing ones in working order. In addition, he was a "hands-on" teacher for generations of graduate students and postdocs and never gave up when faced with a problem. In fact, he often demonstrated that the most complex situations usually had the simplest solutions. On the other hand, his sense of humor frequently led him to display the "insides" of an instrument and pretend that the task at hand was gargantuan, when all that was required was the mere turn of a screw. This would enable him to take an extended walk or hang out at the various eateries around campus because the instrument could not be repaired that day. Nevertheless, Gary was a critical contributor to the success of the experimental work in the lab, and his retirement leaves a vacuum that cannot be filled. His future informal "consulting" visits to the lab are eagerly awaited.

The current members of the Scheraga group expressed their appreciation for Gary's long and helpful service at a dinner party on Saturday night, March 20, 2004. Clearly, not only the present group but also the many past group members are indebted to him for all his help over the years.

Chair's column, continued

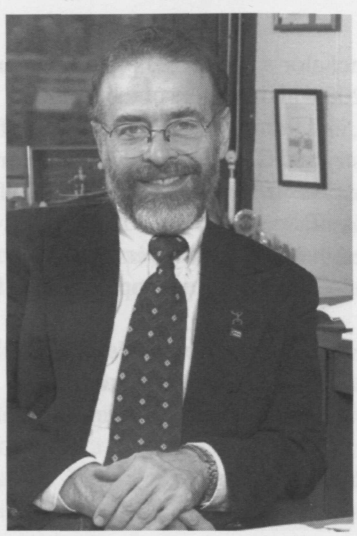
synthetic organic chemistry, with a special emphasis on methods for making molecules of importance to biology and medicine.

Garnet obtained his B.A. in natural sciences from Cambridge and stayed there for his Ph.D., working with Nick Handy. He spent two years as a Miller Postdoctoral Fellow at Berkeley, working in part with Martin Head-Gordon, before returning to Cambridge for his present position. His research at Cornell will be centered on the development of fundamental methods in electronic-structure theory, with applications to everything from materials science to iron-sulfur proteins.

I have written about our efforts to obtain new facilities in previous newsletters, but several new developments are worthy of note. With generous support from the college and university, we have undertaken major renovations in Baker and S. T. Olin laboratories. This work has provided upgraded labs for Geoff Coates, as well as new research space for two chemical biologists, an experimental physical chemist, and a synthetic chemist (Jón Njarðarson). In addition, we have prepared a specially air-conditioned room for the large-scale computer clusters that Harold Scheraga already uses and Garnet will be using. All of the renovations should be complete by the summer.

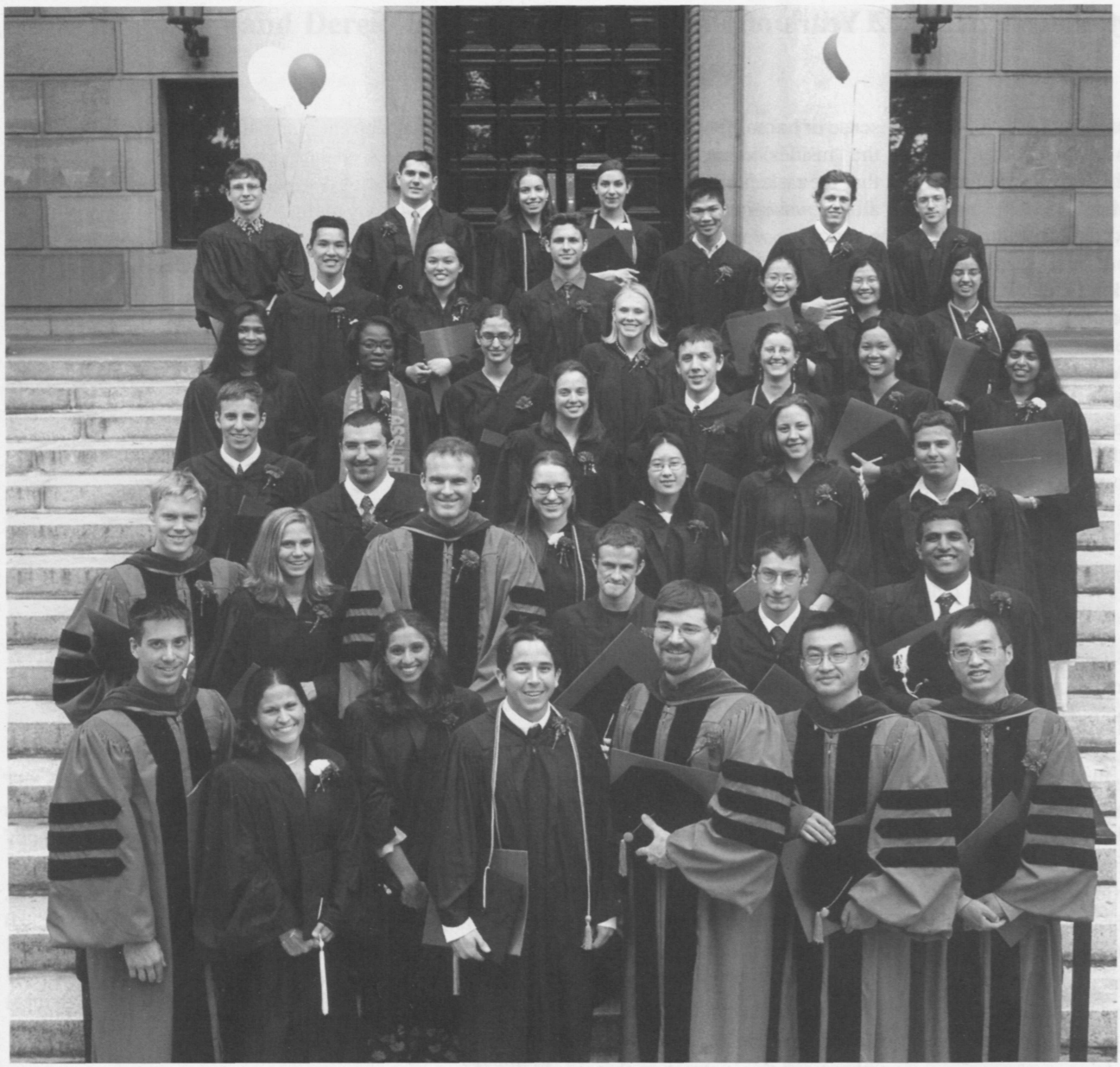
The plans for the new building, to be shared with our colleagues in the Department of Physics and the School of Applied and Engineering Physics, are also moving along nicely. The project has been approved by the Board of Trustees, as has the site. It will be located where the plaza in front of Baker is currently situated. Quite a bit of the building will be below ground, both to ensure that we can add the new space that we require without creating a structure that would dwarf the existing buildings, and to take advantage of the underlying bedrock that allows construction of valuable low-vibration research space. By the time you read this, the meetings with the architects that will lead eventually to a specific building design will have begun.

And finally, there is the leadership component. I will be stepping down as department chair on June 30, and Roger Loring will be leaving his post as associate chair at the same time. I am very pleased to say that Tito Abruña has agreed to take over as chair and Geoff Coates as associate chair, starting on July 1. As most of you know, these are two of the most vigorous and accomplished faculty members in our department, and so there is no doubt that the future of Chemistry and Chemical Biology at Cornell is in excellent hands. I would like to take this opportunity to thank Roger for his steadfast service as associate chair and to thank both Tito and Geoff for their willingness to add these substantial new responsibilities to their already overtaxed lives. I am certain that I speak for my colleagues and the readers of this newsletter in wishing them every good fortune for the future.



Héctor Abruña, incoming Chair

Commencement 2003



Undergraduate and graduate students, Commencement 2003

New bachelor's degree recipients convened in Baker 200 with members of the faculty, friends, and family for the Department of Chemistry and Chemical Biology's diploma presentation on Sunday, May 25, 2003. The departmental ceremony and reception followed the 135th all-university commencement at Schoellkopf Stadium.

The new graduates were presented their diplomas by Professor and Chair Barry Carpenter, who spoke on "Liberal Arts."

August 2002 Graduate
Tim Joseph Biegeleisen

January 2003 Graduates
John Daniel Brockman, Jaclyn Marie Jansen, Vi Huu Nguyen, Kiran Polisetty Sekhar, Sarah Vincent

May 2003 Graduates
Adam Seth Bodzin, Xenia Borue, Christopher Michael Brodowski, Wendi Cheng, Sarah Chiang, Robert Chumanov, Katharine Elisabeth Davidson, Sharada Devarasetty, Pamela Diaz, Elizabeth Marjorie Flanagan, Timothy Alan Flood, Wing Yin Fok, Keith Elliott Follmar, Ruby Elena Grinolds, Frederick Andrew Heberle, Hoi Pan Huang, Jennifer K. Hui, Geoffrey Charles Hunt, Andrea Diane Kops, Zuleikha Kurji, Daniel Lam, Joseph Alan Lamonte, Mansi Mehta, Camille Marie Moore, Dan Cristian Florin Nacuta, Miki Nakayama, Phyllis Owusu-Sarpong, Theron J. Pappas, Stephanie Lynn Potisek, Adrian Repic, Jose Bernardo Saenz, Neil Sinha, Smrita Sinha, Gavin Tyler Slitt, David Stringer, Brian J. Wolk, Daniel Sielin Wu, Jeffrey Yunjord Wu, Amy Yang, Jessica Zellhoefer

Graduating with Honors
Magna Cum Laude
Keith Elliott Follmar, Jennifer K. Hui, Zuleikha Kurji, Jessica Zellhoefer

Cum Laude
Sarah Chiang, Stephanie Lynn Potisek, Jose Bernardo Saenz

Undergraduate Awards

The Leo and Berdie Mandelkern Prize was established in 1991 with a gift from Leo Mandelkern, AB '42, PhD '49, and his wife, Berdie, and is awarded annually to an outstanding student of the senior class majoring in chemistry who will go on to graduate study in chemistry or biochemistry. The 2003 recipient was **Jessica Zellhoefer**.

The George C. Caldwell Prize was established in 1913 with a gift from Mrs. Grace Caldwell Chamberlain and Professor Frank Caldwell and is awarded annually to two senior chemistry majors who have shown general excellence. The 2003 recipients were **Keith Elliott Follmar** and **Zuleikha Kurji.**

The Hypercube Scholar Award for Scholastic Excellence in Chemistry, consisting of a certificate and copy of HyperChem software, was established in 1998 by Hypercube, Inc. It is given to a graduating senior who has shown excellence in courses and research and who has shown an interest in chemical molecular modeling. The 2003 recipient was **Peter Clark.**

The Merck Index Award, which consists of a Merck Index with the name of the recipient imprinted in gold, is given by Merck & Co., Inc., and is presented to two outstanding chemistry majors in the senior class. The 2003 recipients were **Stephanie Lynn Potisek** and **Jose Bernardo Saenz.**

The Harold Adlard Lovenberg Prize was established in 1939 with a gift from Mr. Oscar R. Lovenberg and is awarded annually to student majoring in chemistry who has shown general excellence. The 2003 recipient was **Cristian Gradinaru.**

The ACS Analytical Prize is awarded to a student in the College of Arts and Sciences who has completed the third year of undergraduate study and who displays interest in and aptitude for a career in analytical chemistry. The recipient, **Stephen Zuend,** receives an eight-month (16 issues) subscription to *Analytical Chemistry.*

The CRC Press Chemistry Achievement Award is presented to two sophomore chemistry majors who do outstanding work in organic chemistry courses 357–358 or 359–360. The 2003 recipients were **Hannah Seidel** and **Dana Christofferson.**

The A. W. Laubengayer Prize was established in 1966 with a gift from former students and colleagues of Professor Laubengayer and is awarded annually to an outstanding student in each of the introductory chemistry courses 103, 207, and 215. The 2003 recipients were **Brian Friedman, Christina Hayes,** and **Claudia Lutz.**

Ph.D. Diplomas and Awards

August 2002

Jason A. Barron
Ying Ge
Arun Gidwani
Jonas Isaac Goldsmith
Matthew R. Gronquist
Phillip Dene Hustad
Ashley R. Jones
Armah Marsa Kpissay

January 2003

Bogdan Radu Cosofret
Zhebo Ding
Jennifer Marie Gaudioso
Mi Jin
Cheng Lin
Erick Strauss
Adam Steven Veige
Douglas Benjamin Weibel
Qian Xia
Tianyue Yu

May 2003

David Roger Moore
Lee Richard Rieth
Jonathan Jerome Schroden

August 2003

Mihaela Bojin
David Andrew Broyles
Guillermo Alberto Calero
Matthew Eugene Cremeens
Jianbo Di
Amitavikram Anand Dixit
Pradeep Gutta
Christopher Bryce Hoffman
Darrell Eugene Hurt
Songping Liao
Thomas K. Reynolds
Rikard A. Wind
Pinjing Zhao

The Teaching Excellence Awards are awarded annually to teaching assistants who have demonstrated excellence in teaching and a desire to upgrade the quality of undergraduate education. Graduate students who received the prize for 2003 were **Christopher Byrne, Jamie Cohen, Marc Faggin,** and **Kristin Price.**

The Richard Evans Prize is awarded when faculty and students from introductory chemistry courses reach a broad consensus that there is a teaching associate who meets the high standards of service to the students set by the late Richard Evans. The honoree for 2003 was **Daniel Lorey.**

The Tunis Wentink Prize is awarded annually to outstanding graduate students in any area of chemistry who have distinguished themselves both academically and in the quality and quantity of their research. Prize winners present their research findings at a symposium held in the spring. The 2003 recipients were **Prabhakar Bhimalapuram, David Roger Moore,** and **Jonathan Schroden.**

The Howard Neal Wachter Memorial Prize is given annually to a promising graduate student in physical chemistry who has demonstrated a potential to contribute to the profession. The 2003 recipient was **William Noid.**

Reunion 2003

Professor Emeritus Fred McLafferty (right) looks at documents from the past with Tony (PhD '76) and Marilyn DeStefano.

On Friday, June 4, the Department of Chemistry and Chemical Biology hosted an open house for returning alumni and friends in the faculty lounge of Baker Laboratory.

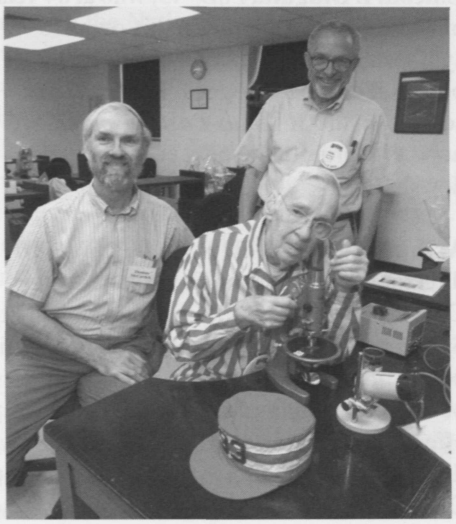
L–R: Robert Platt (AB '73), Senior Lecturer, Thomas McCarrick, Professor Roger Loring, and Sarunya Bangsaruntip (AB '00) talk about earlier days of chemistry at Baker Laboratory.

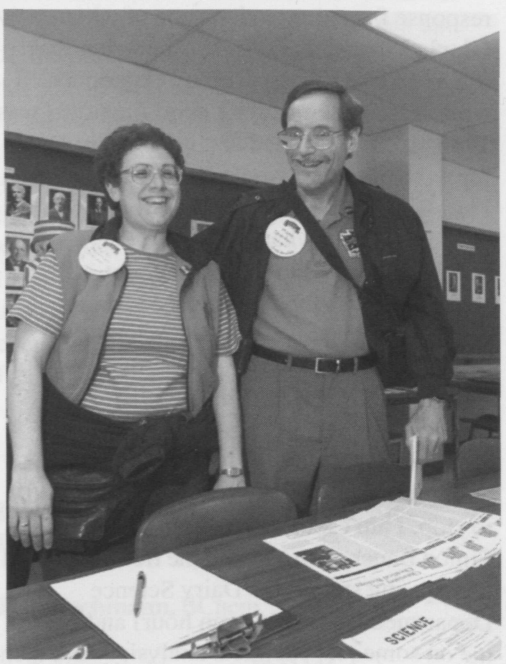
L–R: Earl Peters, executive director emeritus, Howard Abel (AB '58) and Grace S. Gorfin Abel take time out to smile for our photographer.

One of the most popular items at reunion open house is a book of faculty caricatures sketched by Chris Schaller (PhD '93). Future PhD alums Keri Colabroy and Anne McNeil take a stab at identifying who is who.

Photos by Jon Reis Photography

Francis Rosevear (AB '33) came back for a visit. He and his wife, Ruth (AB '36) are shown at left with Ed Wasserman (AB '53) signing in. Dr. Rosevear worked in the microscopy facility when he was here in the 30s. Earl Peters (standing in photo below) and Tom McCarrick (below left) gave him a tour of the facility that gave him such fond memories.





Mark Sheldon (BS '83, MS '85), and his wife, Marti Reisman Sheldon, enjoy the displays.

Looking at the faculty photo board, David Stuhlmiller (AB '92) came back to the halls of Baker Laboratory with his wife, Chris Watters Stuhlmiller (BS '93).

Ed Wasserman (AB '53) shares a few memories with Professor Emeritus Fred McLafferty.

30s

Alfred W. Bennett, AB '33, writes, "I was sorry to read the 'In Memoriam' for Eugene G. Rochow, PhD '35. It brought back memories of my undergraduate days when I took a course at Baker Laboratory on microscopy. He was very active in this discipline, was well respected and, most important, a good instructor. May he rest in peace!"

40s

A note from Lawrence Meyers, AB '89, in the last edition of the newsletter got quite a response from our readers, one of whom was **Gloria Mosesson,** PhD '45. She writes that she had a similar post-Cornell experience. "I worked as a chemist for a short time (this was 1945–46) and realized that it was a dead end for women, on the whole (in that era, at least). I left for a job as a technical editor, and that was the start of what has been a very successful career in publishing, not just technical publishing, but every sort of writing one can imagine. It's included ten books, two of which were Book-of-the-Month selections and I'm at work on two more right now. . .neither of which has anything at all to do with science. I work at many things in publishing and intend never to stop. I am especially grateful to Professor Simon Bauer, who plucked me from a dull and uninspiring stint in the Dairy Science Department (at 50 cents an hour) and started me on some real chemical analysis—and then pushed me into a teaching fellowship, which I not only loved, but which changed my personality from mouse to boss of the classroom."

Cal Y. Meyers, AB '48, is now "retired" after 35 years on the chemistry faculty of Southern Illinois University. He's retired in name only, however, having set up a research institute at the university last year at which he and his staff continue interdisciplinary research in organic and medicinal chemistry. "Similar to Cornell's Department of Chemistry and Chemical Biology, my institute is very much engaged in studies at the interface between chemistry and biology; we work very closely with colleagues in our School of Medicine, College of Agriculture, and Department of Physiology," he writes. Interested alumni can go to www.science.siu.edu/chemistry/meyers-institute/.

Cal also wrote us about another alumnus, **Lincoln I. Diuguid,** PhD '45, who at 84 years of age continues to work in his own lab synthesizing organic compounds that are potential anti-carcinogens. The article he sent, from the *St. Louis Post-Dispatch*, we hope to reprint in the next edition of the newsletter.

Arthur C. Sucsy, PhD '49, was appointed director of the Office of Environmental Compliance at Lubbock Christian University. Sucsy, under the direction of A. T. Blomquist, began his graduate studies in the synthesis of organic compounds that were tested for effectiveness against malaria. In 1944, he was drafted into the U.S. Army and transferred to Oak Ridge, Tenn., where he was assigned to Tennessee Eastman Corporation, a Manhattan Project contractor involved in the separation of uranium isotopes for preparation of the atomic bomb. On discharge from the Special Engineering Detachment at Oak Ridge, Sucsy returned to Cornell to complete his Ph.D. He went to work as a project chemist for the Rohm and Haas Company and spent the rest of his career, until his retirement, with this company. For the past 20 years he served in mid- and upper-level management positions for Rohm and Haas all over the world. Sucsy's areas of interest and experience during his career have been chemistry, education, management, and business. Over the past four years he has worked with Dr. Byron Rogers reorganizing the chemical storage and teaching laboratories at LCU to improve their efficiency and safety.

50s

Bernard Eckstein, PhD '53, writes, "I am very happily settled at Kendal at Oberlin, where we moved a year ago. Other Cornell chemists Leonard Singer, postdoc '50, Ken Coffin, PhD '51, and Frances Coffin, PhD '50, are fellow residents.

In May 2003, a laboratory in the new west wing of Martha Van Rensselaer Hall (MVR) at Cornell was named the Nell I. Mondy Laboratory of Human Performance in honor of **Nell I. Mondy,** PhD '53, professor emerita of nutrition, food science, and toxicology. Mondy is the first professor to endow a space in the new addition of MVR. The lab is designed for human studies of the effects of nutrition on physical work capacity, energy expenditure and physical activity. It is equipped with instruments to measure energy expenditure, physical exertion, and metabolic responses to exercise. Assessment of nutritional status and response to nutritional interventions requires knowledge of the metabolic functions that are measured in this lab. The laboratory, located in the corner of the new MVR west addition, looks over Beebe Lake, a view Mondy says she knows well since it is almost the same view that her former laboratories had in the MVR north wing. Mondy's professional memberships, accomplishments, and goals include being an elected fellow of the American Association for the Advancement of Science, the Institute of Food Technologists, the Institute of Chemists and an honorary life member of the Potato Association of America and Graduate Women in Science. She has served as a consultant to the U.S. Environmental Protection Agency, the U.S. Department of Agriculture and food companies in the United States and abroad. She is author of numerous scientific publications and the books *Experimental Food Chemistry* and, her autobiography, *You Never Fail Until You Stop Trying—The Story of a Pioneer Woman Chemist*, in which she discusses her 50 years in academia, including her worldwide work to improve food and nutrition in India, Nigeria, Indonesia, Ivory Coast, Peru, and the United States, among other countries. Mondy received B.A. and B.S. degrees in chemistry at Ouachita Baptist University in Arkadelphia, Ark., an M.A. degree in biochemistry from Texas University and her Ph.D. degree at Cornell with Harold Scheraga.

Fred Stafford, AB '56, writes that he continues to work at the University of Chicago as director of special projects and continues to enjoy the work. He reports that he traveled to

the Austrian Tirol in July 2002, walking and relaxing in the mountains. In August 2003, he went to Australia for a month; in September, he visited Melbourne Aborigine Territory and viewed their art; then he was off to the Great Barrier Reef!

60s

David N. Harpp, a former visiting professor in the Chemistry Department and a postdoctoral associate from 1965 to 1966, has received the 2003 James Flack Norris Award for Outstanding Achievement in the Teaching of Chemistry from the Northeastern Section of the American Chemical Society.

70s

Mark J. Cardillo, PhD '70, has been appointed executive director of the Camille and Henry Dreyfus Foundation. In 1975 Cardillo joined Bell Laboratories in Murray Hill, N.J., as a member of technical staff in the Surface Physics Department. He was appointed head of the Chemical Physics Research Department and subsequently became head of the Photonic Materials Department. Most recently he was director of Broad Band Access Research. Before joining Bell Laboratories, Cardillo was PRF Research Fellow in the Mechanical Engineering Department at the Massachusetts Institute of Technology. He was a CNR Research Scientist at the University of Genoa and a research associate at Brown University. Cardillo is a fellow of the American Physical Society and has been the Phillips Lecturer at Haverford College and a Langmuir Lecturer of the American Chemical Society. He received the Medrard Welch Award of the American Vacuum Society in 1987, the Innovations in Real Materials Award in 1998, and the Pel Associates Award in Applied Polymer Chemistry in 1000.

Allen Nicholson, AB '75, has joined the faculty of Temple University's College of Science and Technology and will serve as chairperson of the department. The dean of the college, Chris D. Platsoucas, states "Dr. Nicholson is a distinguished scientist whose research has advanced some very important work in the field of RNA and protein interactions. His stature within the scientific and academic communities will continue to enhance the chemistry department's status as world-class." Although trained as a chemist, Nicholson has evolved into a molecular biologist. His research, which is funded by the National Institutes of Health, focuses on understanding how cellular and viral genes are expressed and regulated.
Michael Hecht, AB '77, has two reasons to be happy—recently he was promoted to full professor at Princeton, and he was presented the Kaiser Award from the Protein Society at its annual meeting in July 2003. Congratulations, Michael!

80s

Michael Cannarsa, PhD '84, has joined Chemi Pharma as president, having worked in various capacities within the pharmaceutical fine chemicals industry for more than 12 years, most recently as director of business development at Synthetech.

C&EN reports that **Deborah E. Leckband,** PhD '88, is the new head of the chemical and biomolecular engineering department at the University of Illinois at Urbana-Champaign. She joined the faculty there in 1995 and will continue as a professor in the department of chemical engineering. She is also a professor in the university's Micro and Nanotechnology Laboratory and at the Beckman Institute for Advanced Science and Technology. Her work on the molecular mechanisms of cell adhesions is changing the thinking about how proteins hold cells together in tissues.

90s

After leaving Cornell, **Ythan Goldberg,** AB '97, attended the New Jersey Medical School and graduated in May 2001. He is currently in his third year of residency at Montefiore Hospital, which is the teaching hospital of Albert Einstein Medical School. He recently received a fellowship in cardiology from Montefiore and will begin that after he finishes his residency. He plans to marry in May 2004; his future wife is also a doctor. Best of luck, Ythan!

Rajeev Shah, AB '99, writes, "After graduating from Cornell University with a degree in chemistry, I decided to work for a software consulting firm in New York City. After gaining some strong technical experience and being exposed to several different industries, I moved to Boston, Mass., and worked within the biotechnology sector. I have been working as an information technology project leader at Altus Biologics, a life-science organization with innovative technology to enable the rapid crystallization of proteins. My position has enabled me to assess and define the challenges and limitations within our scientific process, and provide technical solutions to solve them. I have had a unique opportunity to apply my undergraduate training and recent work experience to my current position. I plan to return to graduate school next year to pursue an MBA with a focus on life sciences and biotechnology. If anyone would like to discuss their experiences with me, I would be pleased to hear from them at rajeevmshah@hotmail.com."

In Memoriam

Bernard John Staneslow, BChem '31, December 2000

Karl Pechmann, BChem '38, 2000

Aubrey "Ole" Larson, PhD '46, February 17, 2004

Robert J. Tedeschi, AB '44, MS '45 PhD '47, 2002 (Phillip Adams, PhD '50, writes, "I feel sad to announce the death of Robert J. Tedeschi in 2002. Dr. Tedeschi was a student of Professor A. T. Blomquist. I knew him while at Cornell but got to know him [better] when we both worked at American Cynamide (1950) and later when he roomed with me in Plainfield, N.J. Bob was an authority on acetylenic chemistry while at Air Reduction, and Air Products. He was married and the father of three children. I will deeply miss him.")

Joseph H. Brant, PhD '35, December 24, 2003

continued on next page

News from Alumni and Friends

Arno Spatola, AB '66, an accomplished chemistry professor at the University of Louisville, died on July 5, 2003, of a heart attack. He was 59. A native of Albany, N.Y., Spatola earned a bachelor's degree in chemistry from Cornell University in 1966. He then attended the University of Michigan, Ann Arbor, where he earned a master's degree in 1969 and a Ph.D. in 1971, both in organic chemistry. Following graduation, he did two years of postdoctoral work at the University of Arizona, Tucson. Spatola's research focused on peptide chemistry. He taught the first class at Louisville in combinatorial chemistry and was one of the first scientists to create libraries of peptides. He also cofounded the university's Institute for Molecular Diversity and Drug Design and served as its director from 1997 to the time of his death. In 1983, Spatola founded Peptides International, a biochemical company specializing in peptide products and synthesis. He served as president and chief executive officer of the company for 20 years while maintaining his professorship. Spatola also was a founding member of the American Peptide Society and was serving as the organization's current secretary. He was on the editorial boards of the *Journal of Peptide Research* and *Letters in Peptide Science*, and he served as an ad hoc reviewer for the National Institutes of Health. Spatola joined ACS in 1968. He is survived by his wife, Jacqulyn, and one daughter.

Lost Undergraduate Alumni A–M

As in the past, the department asks for you help in locating the following individuals. If you know of any contact information, please e-mail Kelly Strickland at kss1@cornell.edu, or US mail to the address on the back page. Thank you.

Aalbersberg, William, AB, '70
Aanning, Harald, AB, '62
Abbott, Kenneth, AB, '83
Abdel-Samed, Gihan, AB, '91
Abramson, Ira, AB, '55
Acero, Anibal, AB, '88
Addonizio, Victor, AB '69
Adipietro, Robert, AB, '83
Adler, Haskell, AB, '84
Ahn, Peter, AB, '87
Alba, William, AB, '86
Alcott, Sasha, AB, '95
Allen, Barbara, AB, '73
Alma, Alisa, AB, '91
Amrani, Jacob, AB, '78
Anderson, Alfred, AB, '64
Anderson, Francis, BCHEM, '24
Anderson, Leslie, AB, '73
Angell, William, AB, '57
Apple, David, AB, '76
Arnold, Don, AB, '88
Asch, Kenneth, AB, '69
Atlas, Susan, AB, '64
Baeger, Victoria, AB, '94
Bagchi, Kunal, AB, '91
Bailey, John, AB, '64
Bakirtzis, Virginia, AB, '80
Bales, Thomas, AB, '93
Ball, Frederick, BCHEM, '41
Banfield, David, AB, '95
Bardin, Collis, BCHEM, '24
Barnard, Thomas, AB, '70
Basarab, Robert, AB, '74
Bases, Robert, AB, '51
Battaglia, J., AB, '74
Bauer, Paul, AB, '84
Bazell, Carol, AB, '83
Beall, Melissa, AB, '89
Beaman, Orson, BCHEM, '29
Becker, Arnold, AGR, '42
Becker, Kevin, AB, '89
Bedell, Kenneth, AB, '69
Beegan, Jessica, AB, '02
Begun, Alvin, AB, '66
Belasco, Joel, AB, '75
Bendis, Ina, AGR, '68
Berger, Michael, AB, '66
Berman, Stanley, AB, '67
Bernstein, Joel, AB, '62
Bernstein, Nathan, AB, '87
Berntson, Ross, AB, '93
Bickley, Robert, AB, '53
Biegeleisen, Tim, AB, '02
Blanchard, William, AB, '76
Blazey, Charles, AB, '95
Bleiweis, Mark, AB, '85
Boerger, Rebecca, AB, '85
Boerke, Sean, AB, '94
Bohn, Martha, AB, '64
Bolak, William, AB, '71
Bosenberg, Marcus, AB, '86
Bourguignon, Gerard, AB, '63
Bowser, William, BCHEM, '30
Bowzard, John, AB, '93
Boxer, Matthew, AB, '75
Boyd, Cheryl, AB, '80
Brackett, Nathaniel, AB, '94
Brantigan, John, AB, '66
Braun, Michael, AB, '77
Brenner, Tamara, AB, '86
Bresnick, Sandra, AB, '86
Briggs, Gwynne, AB, '67
Briggs, Howard, BCHEM, '38
Brinley, Floyd, AB, '83
Broce, Bradford, AB, '96
Brockway, William, AB, '51
Brown, Anthony, AB, '90
Brown, Cynthia, AB, '87
Brown, Richard, AB, '51
Bruckel, William, AB, '67
Bruns, Robert, AB, '51
Buenafe, Michael, AB, '90
Bungcayao, Kimberly, AB, '95
Burdick, James, BCHEM, '35
Burkins, Charles, AB, '87
Burn, Joanne, AB, '87
Burrows, William, AB, '53
Buryan, Richard, AGR, '72
Butcher, Bruce, AB, '67
Cadile, Casey, AB, '96
Cameron, Thomas, AB, '94
Campbell, Kimberly, AB, '96
Caplan, Daniel, AB, '86
Carberry, Judith, AB, '58
Cardinali, Martin, AB, '84
Carmichael, Richard, AB, '70
Carnahan, Edmund, AB, '87
Carter, James, AB, '57
Carter, Joshua, AB, '97
Carter, Zachary, AB, '92
Cartland, Harry, BA, '80
Casagrande, Caroline, AB, '96
Cascio, Michael, AB, '81
Chan, Kenneth, AB, '87
Chan, Robin, AB, '01
Chang, Greta, AB, '79
Chang, Hao, AB, '86
Chang, Jacqueline, AB, '94
Chang, Mary AB '80
Chang, Mary, AB, '87
Chao, Jade, AB, '92
Chapin, John, BS, '35
Chasin, Mark, AB, '63
Chau, Minh Hang, AB, '90
Chay, Mary, AB, '77
Chen, Janice, AB, '88
Chen, Jennie, AB, '90
Chen, John, AB, '92
Chen, Sen, AB, '76
Chen, Steven, AB, '84
Chen, Susan, AB, '92
Cheng, David, AB, '84
Cheung, Amy, AB, '94
Chickos, James, AB, '86
Chin, Lawrence, AB, '86
Cho, Hyejin, BA, '98
Choi, Chang, AB, '89
Choi, Eugene, AB '92
Chong, Anthony, AB, '73
Chow, Jennifer, AB, '97
Christenfeld, Stanley, BCHEM, '39
Christensen, Donald, AB, '60
Chu, Julie, AB, '87
Chua, Walter, AB, '92
Chung, Connie, AB, '93
Chung, Jennifer, AB, '98
Chung, Ki, AB, '91
Chung, Theodore, AB, '84
Cicale, John, AB, '85
Clark, Jr., Christopher, AB, '95
Clericuzio, Carol, AB, '69
Cocero, Nanette, AB, '85
Coester, Frederick, AB
Cohen, Soloman, AB, '46
Cole, Jr., Theron, AB, '63
Collazo, Diana, AB, '86
Colonell, Jennifer, AB, '89
Colt, Shannon, AB, '86

Compton, Anne-Marie, AB, '97
Condit, William, BChem, '22
Connell, Dorothea, AB, '26
Connolly, George, BCHEM, '33
Conser, Kathryn, AB, '90
Coope, Stephen, AB, '88
Cooper, David, AB, '85
Cooperman, Arthur, AB, '75
Corcoran, Ethan, AB, '92
Cormack, Alan, AB, '70
Cothran, Jr., Floyd, AB, '55
Coulter, Susan, AB, '80
Crowder, Valda, AB, '86
Crowley, Michael, AB, '92
Culver, Stephen, AB, '66
Cunningham, Robert, AB, '94
Custer, Calvin, AB, '48
Damle, Jai, AB, '00
Damsker, Jason, AB, '93
D'Annunzio-Szymczak, Camille, AB, '77
Davidson, William, AB, '95
Davila, Maria, AB, '89
De Mayo, Frank, AB, '78
Dechant, Hallie, AB, '80
Dejesus, Alain, AB, '76
Dennis, Jr., Warren, BCHEM, '31
Derow, Alison, AB, '96
D'errico, Michael, AB, '54
Devaney, Stephen, AB, '96
Di Cyan, Adrian, AB, '62
Diaz, Adis, AB, '00
Dickinson, Paul, AB, '86
Dilmanian, Hooman, BA, '98
Dodge, Joan, AB, '53
Doleckyj, Steven, AB, '97
Donnalley, III, James, AB, '69
Doucette, Kari, AB, '84
Duane, Jerome, BCHEM, '38
Dudzinski, Edward, AB, '73
Dym, Andrew, AB, '83
Edelstein, Richard, AB, '52
Edgerton, Eric, AB, '77
Edmondson, Scott, AB, '91
Ehoi, Eugene, AB, '92
Eisner, Staci, AB, '92
Elam, Jeffrey, AB, '88
Elmendorf, William, BEE, '49
ElNaggar, Mariam, AB, '02
Emerson, Jeffrey, AB, '90
Epstein, Robert, AB, '80
Erdeonmez, Can, AB, '97
Ernst, Charles, BCHEM, '35
Ervin, John, AB, '95
Escamilla, Sarita, AB, '85
Eslava, L., AB, '00
Etingoff, Carol, AB, '83
Eurenius, Kirsten, AB, '88
Ewer, Steven, AB, '96
Facey, Margaret, AB, '75
Fakheri, Farzad, AB, '87
Farley, Robert, AB, '80
Fay, Peter, AB, '77
Feighery, William, AB, '85
Feldmann, Edward, AB, '79
Fellner, Michael, AB, '56
Feng, Amy, AB, '88
Feng, Helen, AB, '83
Ferguson, Lee, AB, '59
Fernsler, Edward, BCHEM, '34
Fialkow, Donald, AB, '81
Fine, Alan, AB, '74
Fine, Jeffrey, AB, '76
Fine, Melanie, AB, '87
Fine, Stephen, AB, '91
Fink, Thomas, AB, '63
Fishel, Robert, AB, '83
Fisher, Richard, AB, '56
Fishkoff, Daniel, AB, '53
Fleckenstein, Jaquelyn, AB, '81
Flower, Donald, BSAGR, '35
Fogarty, Colleen, AB, '87
Folger, Walter, AB, '67
Foster, Ruth, AB, '59
Frank, Lawrence, AB, '86
Frank, Martin, AB, '59
Frank, Robert, AB, '55
Frederick, Jennifer, AB, '93
Fregeau, Nancy, AB, '86
Fusco, James, AB, '63
Gabel, Marc, AB, '58
Ganguly, Ashit, '92
Garger, Alexander, BA, '98
Gensheimer, Gregory, AB, '73
Gerbarg, Zachary, AB, '75
Gerbino, John, AB, '79
Gerry, Russell, AB, '80
Gertzog, Irving, BCHEM, '41
Ghanbarpour, Susan, AB, '94
Gillette, Thomas, AB, '69
Gilliam, Carla, AB, '88
Glass, Flora, AB, '37
Glatstein, Norman, AB, '51
Golben, Michael, BCHEM, '36
Goldberger, Stephen, AB, '69
Goldenberg, David, AB, '70
Goldman, Irving, AB, '53
Goldschmidt, Marc, AB, '90
Gonzales, Miguel, AB, '95
Gould, Roy, AB, '68
Grant, Angela, AB, '81
Grant, William, AB, '73
Graves, Lisa, AB, '79
Gray, Allan, AB, '43
Gray, Jr., Arthur, AB, '50
Greenberg, Roy, AB, '87
Greenberg, Stanley, AB, '56
Greenman, Richard, AB, '64
Greenwald, Michael, AB, '59
Greer, Verna, AB, '97
Gregory, Arthur, AB, '52
Grenen, Carl, AB, '56
Gross, Gary, AB, '62
Grossman, Ofer, AB, '87
Grundy, David, AB, '92
Gschwend, Daniel, AB, '91
Gurowitz, William, AB, '53
Haddad, John, AB, '53
Hadley, David, AB, '90
Hamori, Christine, BA, '85
Hampton, Robert, BCHEM, '35
Han, Ken-ryu, AB, '91
Hansen, Nancy, AB, '75
Hansen, Ralph, AB, '44
Hanson, Morin, AB, '79
Hapangama, G., AB, '94
Harford, Steven, AB, '94
Harms, Warren, AB, '50
Harrington, Joel, AB, '85
Hart, Harold, AB, '51
Hasen, Joel, AB, '88
Hasenyager, Jennifer, AB, '90
Hassett, Eleanor, AB, '39
Hathaway, Floyd, BCHEM, '41
Hedberg, John, AB, '50
Heller, Diane, AB, '87
Heller, Philip, AB, '65
Hemker, Jr., Arthur, AB, '59
Henderson, Roy, AB
Hendley, III, Coit , AB, '75
Henley, Thomas, AB, '64
Hensleigh, Michelle, AB, '93
Herbert, Morgan, AB, '96
Hergenrother, Richard, AB, '36
Herman, David, AB, '81
Hing, Frederick, AB, '85
Hinkle, Paul, AB, '90
Hirji, Shemin, AB, '94
Hirsch, David, AB, '73
Ho, George, AB, '68
Ho, Michael, AB, '97
Ho, Thao, AB, '96
Hobbs DeWitt, Sheila, AB, '82
Hobby, George, BCHEM, '38
Holtmeier, Nikki, AB, '97
Hong, Ki, AB, '89
Hooper, N., AB, '61
Hopkins, Paul, B,
Horn, Thomas, AB, '68
Horning, David, AB, '75
Horton, Christy , AB, '74
Horwitz, Bruce, AB, '84
Hoy, John, BCHEM, '27
Hoyt, Scott, AB, '92
Hsu, Cher, AB, '55
Hsu, Shih-Wen, AB, '85
Huang, David, AB, '85
Huang, Philip, AB, '92
Huang, Richard, AB, '94
Hubach, Clifford, BCHEM, '24
Hughes, Richard, BSAgr, '65
Hughes-Toro, Paul, AB, '80
Hunt, Harriet, AB, '75
Hunter, Dorothy, BS AGR, '27
Hutchins, Charles, AB, '75
Hymans, William, AB, '62
Ingerson, Thomas, BCHEM, '39
Jacobs, Daniel, AB, '55
Jacobsen, Slyvia, AB, '52
Jain, Vivek, AB, '87
James, Catherine, AB, '91
Jarvis, Jerome, AB, '54
Jim, Bun, AB, '94
Joesten, Elizabeth, AB, '63
Johnson, Arnold, AB, '36
Johnson, Leonie, AB, '86
Jones, Kenneth, AB, '79
Jones, Lawrence, AB, '72
Joseph, Nilufer, AB, '83
Josephson, Melissa, AB, '85
Juenger, Martha, AB, '80
Jung, Hae Ho, AB, '86
Kalai, Kerren, AB, '93
Kalwani, Priya, BA, '98
Kaminsky, Milla, AB, '92
Kang, David, AB, '85
Kang, Jamie, AB, '85
Kang, Sang-Mo, AB, '86
Kang, Soo-Chan, AB, '86
Kaplan, Harold, AB, '48
Kaplan, Seth, AB, '92
Kaplan, Seymour, AB, '38
Karny, Geoffrey, AB, '70
Kaufman, W., AB, '61
Kaussner, Andrea, AB, '83
Kautz, Henry, AB, '78
Kay, Michael, AB, '91
Kay, Peter, AB, '59
Kayman, Harvey, AB, '64
Kazaras, Michael, AB, '62
Kazimi, Abdul, AB, '50
Keith, Jerry, AB, '67
Kelley, Robert, AB, '68
Kelly, David, AB, '95
Keysor, Allan, AB, '65
Khanmohamadi, Azin, AB, '88
Kim, Ji-In, AB, '86
Kim, Beom-June, BA, '98
Kim, Chu-Young, AB, '96
Kim, Elaine, AB, '91
Kim, Hyung-Chan, AB, '97
Kim, Paul, BA, '98

Kim, Peter, AB, '96
Kim, Scott, AB, '88
Kim, Tae Ho, AB, '87
Kimmel, Donald, AB, '68
Kinkele, Adelaide, AB, '26
Kirsopp, Edgar, BA, '50
Klausner, Jeffrey, AB, '86
Klein, Alan, AB, '67
Kneezel, Lawrence '70
Ko, Jesse, AB, '92
Koch, Lawrence, AB, '37
Kogon, Alfred, AB, '52
Konecny, Jan, AB, '50
Kong, Kin, AB, '89
Kopita, Jonathan, AB, '87
Kops, Andrea, AB, '03
Korenblat, Kevin, AB, '91
Korman, Jeremy, AB, '86
Korol, Oksana, AB, '97
Kowalczyk, Matthew, AB, '84
Kozlowski, Marisa, AB, '89
Kresch, Alan, AB, '52
Krieger, Jr., Frederick, AB, '57
Krochmal, Michael, AB, '95
Krosner, Seth, AB, '83
Kruger, Robert, AB, '79
Ku, Jean, AB, '94
Kubisen, Jr., Steven, AB, '74
Kuldell, Natalie, AB, '87
Kulik, Lauren, AB, '85
Kumar, Naveen, AB, '00
Kurman, Betty, AB, '45
La Villa, Joseph, AB, '85
Ladin, Leonard, AB, '55
Lai, Helen, AB, '96
Lamonte, Joseph, AB, '03
Landa, Elizabeth, AB, '88
Lang, Daniel, AB, '88
Langford, S., BS, '00
Langone, Anthony, AB, '92
Lappeman, Myron, AB, '61
Latella, John, AB, '84
Laumas, Sandeep, AB, '90
Lavallee, Jr., Courtland, AB, '77
Laviska, David, AB, '89
Lawrence, Edward, BCHEM, '40
Lazrus, Florence, AB, '56
Leather, William, BCHEM, '37
LeBar, Randi, AB, '78
Leber, George, AB, '72
Leddy, Anne, AB, '65
Lee, Arthur, AB, '87
Lee, Dorothy, AB, '58
Lee, Edwin, AB, '92
Lee, Eugene, AB, '90
Lee, Janette, AB, '89
Lee, Jinnho, AB, '99
Lee, Mary, AB, '79
Lee, Rebecca, AB, '97
Lee, Ruth, AB, '38
Leftow, Stewart, AB, '81
Lehr, Timothy, AB, '73
Lenchitz, Bernard, AB, '80
Leonardi, Jospeh, AB, '74
Leone, Vincent, AB, '88
Levine, Paul, AB, '70
Levy, Milton, AB, '56
Levy, Robert, AB, '57
Li, Kenneth, AB, '94
Lieberman, Zorba, AB, '87
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