Chemistry and Chemical Biology

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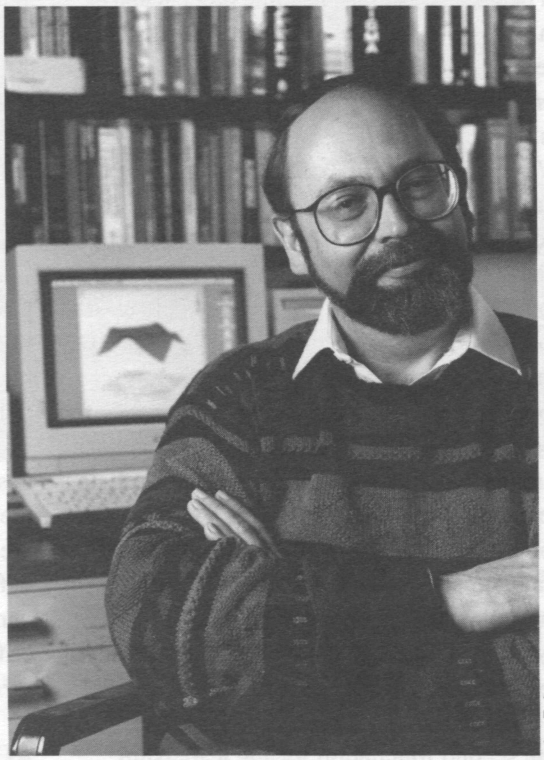
The Chair's Notebook

Looking to the Future

It is probably natural for a new department chair in any academic field to start out by contemplating what might be accomplished during his or her term. That is certainly part of the theme in my first contribution to the newsletter. For chemists in particular, however, it is clear that local departmental plans need to be viewed in the context of the much more global changes that are occurring within our discipline as a whole, and so I will begin by outlining my views on those.

Many of us have taken pride in working in the "central science" whose concepts, techniques, and products have found application in so many other areas of research and technology. In recent years the range of these applications has expanded to such a degree that it is no longer obvious where the boundaries are between chemistry and such neighboring disciplines as biology, materials science, physics, mathematics, and simulation. Some chemists may be concerned that these developments could lead to the loss of identity of their field. However, my personal view is that, because the disciplinary boundaries were largely artificial in the first place, their dissolution poses no threat. Rather, the new integration of domains of scientific inquiry opens the possibility for a breadth and pace of advance that is truly exciting to contemplate.

Occurring in parallel with these advances in research are changes in methods of instruction. New technology holds the promise for providing students with previously unimaginable access to humanity's collective store of knowledge and belief. It also seems likely that technological advance will permit a reevaluation of the fundamental relationship between instructor and student. The basic format of instructional transaction has remained unchanged for centuries, but does that mean it has already been optimized, or could the needs of the modern world be better met by a different pedagogical structure? The newly emerging distributed education or distance learning approaches, for example, may blur the boundaries between instructor and student just as the old defining lines between the scientific disciplines are themselves becoming less distinct. The program in support of new technological approaches to teaching recently announced by Provost Biddy Martin will, I predict, be seen in retrospect as only the beginning of an entire revision of the educational enterprise across the campus. Other universities will undoubtedly be confronting similar issues in the near future.



Barry Carpenter

Thus, regardless of the balance between our individual interests in research and teaching, the prospects for dramatic change in what we all do seem to be on the horizon. And I will argue that we in Cornell's Department of Chemistry and Chemical Biology are positioned not just to participate

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in this revolution but to be among its leaders. Let me highlight three characteristics of this department that I believe provide the foundation for such a role.

The first is collaboration. It seems inevitable that much of our research in the future will require a cooperative approach to problem solving, because even the most talented individual will not have the breadth of expertise that the new research problems will demand. Let me draw your attention to the recent article in *Chemical & Engineering News* (2001, 79, 5) on Eli Lilly and Company's "InnoCentive" web site; it makes the point very clearly. Large-scale collaboration, however, has not been the hallmark of research in chemistry as it has in some other sciences. In fact, at most of the top-ranked chemistry departments in the country one might characterize the connection between research groups as more like the attractive forces in a van der Waals cluster than those in a network solid. However, our department constitutes a clear exception. Visitors to Cornell's Department of Chemistry and Chemical Biology repeatedly comment on how unusual the atmosphere of cooperation and collegiality is. We ourselves know that this provides more than just a comfortable working and social environment; it fosters exactly the kinds of collaborative links that the future research in our field is likely to demand. While we cannot afford to be complacent and should do all that we can to maintain and enhance our cooperative environment, this surely will be easier than trying to create it de novo, as many other departments will have to do.

The second foundation for the leadership position that I envision is the exceptional quality of our younger colleagues. While the senior faculty can certainly be expected to build on their outstanding record of scholarship over the coming years, the fact remains that the future success of this department will depend in large measure on the creativity and ingenuity of the younger faculty and their coworkers. Given who those individuals are and what they have already accomplished, it is impossible not to be excited and enthusiastic about where they will be taking us. The very recent additions of Paul Chirik and Tyler McQuade to our ranks (see pages 3 and 4) only serve to emphasize the strength that we have in this group. It is particularly noteworthy that all of the younger faculty in the department have exactly the kind of interdisciplinary interests and expertise that future research in our field will almost certainly demand.

Finally, and of equal importance to the other two characteristics that I have highlighted, is the department's strong commitment to teaching. Again, this seems to be an area where we differ from several of the other top-ranked departments in the country. While some measure of this dedication can certainly be attributed to adherence to principle, there is also a pragmatic component at work. Many of us have found our own research ideas influenced by the review and reorganization of basic concepts that are involved in teaching. Many have also had the experience of inspiring a bright undergraduate or graduate student in one of our classes to join our research groups. If the revolution in research that I have outlined is indeed going to be accompanied by a parallel revolution in instruction, then the institution that will be best positioned to drive and to benefit from the changes will be the one that can contribute to both simultaneously. In the broadly defined field of chemistry, I find it difficult to name a department that better satisfies these criteria than Cornell's Department of Chemistry and Chemical Biology.

As described so far, my task as chair looks pretty simple: I merely need to occupy the office on the first floor of Baker and let the great things that I have described take care of themselves! Well, not quite. While the cadre of young faculty in the department is one that any university would be proud of, we need to maintain the momentum provided by recent hires and promotions. The demographics of the department demand a more or less continuous search for new faculty even to maintain our current numbers, and of course our intention is actually to expand. And that brings me to the space issue. It is clear to all of us, I think, that the bright future I envision for the department cannot be realized in the confines of our current buildings. While we may have good reason to think that the qualities outlined above will give us a competitive edge in hiring the best new people to join us, the changes in research and teaching that I have described will demand new infrastructure, and the simple fact is that we will be unable to continue to attract outstanding faculty, postdoctoral associates, and graduate students if we fail to make available appropriate facilities in which they can do their work. It is thus obvious that providing impetus to our new building project must be very high on my list of priorities.

As I contemplate these tasks it is with considerable regret that I recognize that I will not be enjoying the full-time benefit of Earl Peters's skills, knowledge, and insight as executive director. However, I plan to make full use of him in his new role as our development and outreach consultant. I am also very happy to contemplate working with Roger Loring in his role as associate chair. I have no doubt that I will be calling on his clear-headed analysis on many occasions during the next three years.

Bringing the plans for hiring and for the new building to fruition will obviously depend on much more than my actions alone. It will require collective effort on the part of almost everyone in the department. Fortunately, the people who constitute the Department of Chemistry and Chemical Biology—and I want to make it explicit that I am including the nonacademic staff—are one of the most cohesive and hard-working groups to be found anywhere on the campus. Thus, while the accomplishment of our goals may depend on some factors that are outside of our control, I feel very fortunate to be working with friends and colleagues in the department who can be counted on to give the tasks at hand their very best effort.

Paul J. Chirik Joins the Department as an Assistant Professor

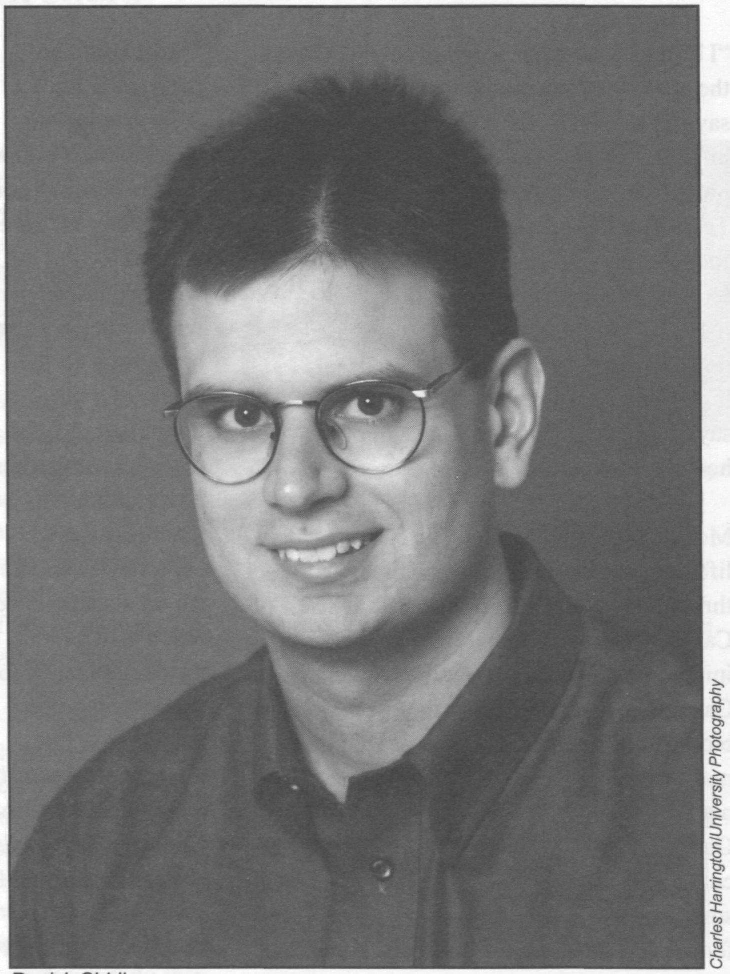
Paul Chirik joins the Chemistry and Chemical Biology faculty after completing a postdoctoral fellowship with Cornell alumnus Christopher C. Cummins at the Massachusetts Institute of Technology. Chirik and his research group are preparing new transition metal compounds that are designed to activate and functionalize ubiquitous small molecules such as nitrogen, elemental phosphorus, and oxygen. The group is also interested in developing new examples of multiple bonds between transition metals and main group elements for a host of applications ranging from catalysis to materials science.

A native of Doylestown, Pennsylvania, a rural suburb of Philadelphia, Chirik's interest in science began in high school when he worked on a local farm and became intrigued by the effects of agrochemicals on crop production and the local environment. Upon graduation from high school in 1991, Chirik began an internship as a research chemist at Penn Color Incorporated, a manufacturer of colorants for a variety of consumer products including automotive paint, nail polish, and photocopier toner. The focus of his research was to convert existing formulations that contained volatile organic solvents to more environmentally benign aqueous media. One automotive finish that he developed during his time with the company has been implemented as the finish for black Saturn sport coupes.

As an undergraduate at Virginia Tech, Chirik joined Professor Joseph S. Merola's research group where he inherited his mentor's enthusiasm and passion for transition metal chemistry. During this time, Chirik studied the aqueous organometallic chemistry of rhodium and iridium and their function as hydrogenation and hydroformylation catalysts. After graduation in 1995, he moved to the California Institute of Technology and joined Professor John E. Bercaw's research group. During his thesis work, Chirik elucidated how a seemingly subtle perturbation in the environment surrounding a transition metal influences its efficiency when making a polymer (plastic).

Building on these fundamental studies, current members of the Bercaw group are designing new transition metal catalysts that will produce polymers with improved properties.

In summer 2000 Chirik was appointed as a postdoctoral fellow with Christopher Cummins at MIT. While in the Cummins group, he explored the coordination chemistry of a new class of ligand designed to stabilize highly reactive, low-coordinate early transition metals such as titanium and molybdenum. It was during his postdoctoral tenure that he developed an interest in nitrogen and phosphorus functionalization.



Paul J. Chirik

"The functionalization of nitrogen, the principal component of our atmosphere, under mild conditions is a holy grail that chemists have pursued for the past century," Chirik says. Although this lofty objective is perhaps one of the most daunting in synthetic chemistry, Chirik and his group believe they have a new approach to this historic problem. A key element of their research is the discovery that certain types of transition metal hydrides react with nitrogen at low temperatures resulting in metal compounds that have elongated and potentially weaker nitrogen-nitrogen bonds. They ultimately hope to develop a process to transform atmospheric nitrogen as well as elemental phosphorus into a host of commodity chemicals ranging from pharmaceuticals and agrochemicals to nylon.

The Chirik group is also interested in developing new examples of transition metal-element multiple bonds. Traditionally, these linkages have been confined to transition elements in the middle of the periodic table and display only modest reactivity. By extending these types of bonds to the far reaches of the d (and potentially f) block elements, Chirik and his students hope to induce new types of reactivity not previously observed. Such molecules could then have applications in a host of areas ranging from biological functions such as oxygen transport to the synthesis of well-defined high-performance ceramic materials.

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D. Tyler McQuade Joins the Department as an Assistant Professor

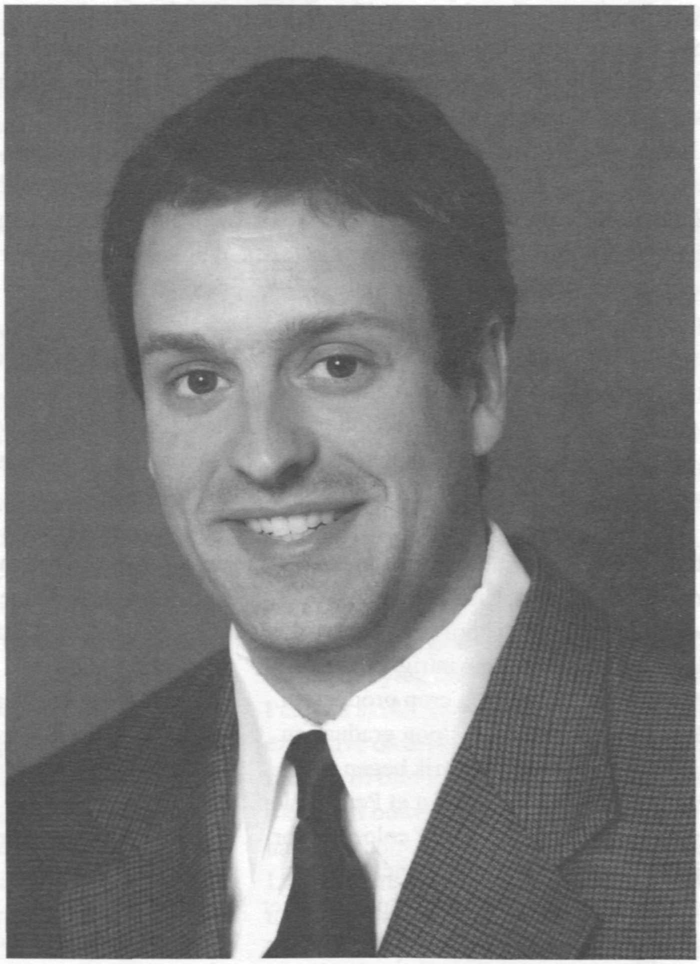
"I bring a biological polymer perspective to the already strong materials group at Cornell," says Tyler McQuade, a new faculty member hired out of an NIH-sponsored postdoctoral position at the Massachusetts Institute of Technology. McQuade's research group will focus on the design, synthesis, and characterization of functional materials. "The materials synthesized in my group will be designed to function as selective catalysts, highly organized materials, and sensors," says McQuade. "Our designs will borrow heavily from nature."

McQuade began his scientific career early in life studying marine biology while walking through the tide pools of the central coast of California with his father. He continued this initial interest in biology at the University of California, Irvine, where he double majored in biology and chemistry. It was at UCI that marine biology gave way to his interest in neurobiology. While working with Professor Gary Lynch, McQuade studied the biochemical underpinnings of memory and received a small grant to synthesize high-affinity ligands for use in affinity purification of a glutamate receptor complex.

"At the time I received the grant, I knew nothing about small molecule synthesis," says McQuade. "After I spent a few months synthesizing my target, I realized that I loved chemical synthesis and decided to leave the Lynch lab and study organic chemistry instead." McQuade then began studying organic methodology with Professor Harold Moore. "Hal is a brilliant chemist and he quickly infected me with his enthusiasm," remembers McQuade.

Combining his interest in biology and chemistry, McQuade obtained his Ph.D. under bioorganic professor Samuel H. Gellman at the University of Wisconsin, Madison. His graduate research focused on the influence that detergent geometry has on detergent-detergent, detergent-membrane, and detergent-protein interactions.

"Most common detergents have a polar headgroup attached to a nonpolar flexible tail," notes McQuade. "We were curious to find out what would happen if we attached a polar headgroup to the center of a rigid nonpolar tail." His research resulted in a novel patented detergent design called a tripod. The tripod's shape is very much as it sounds, a rigid nonpolar tripod supporting a polar headgroup. The interfacial training he received in Madison cemented McQuade's desire to continue investigating chemical science at the interface of biology.



D. Tyler McQuade

From amphiphiles, McQuade moved into functional polymer design while doing a postdoctoral stint with Professor Timothy M. Swager at the Massachusetts Institute of Technology. McQuade's work at MIT used thin film conjugated polymers as amplifiers and transduction layers within thin film sensors. During his time at MIT, McQuade published or submitted three papers on conjugated polymer photophysics in thin films and two papers on conjugated polymer sensors, and he left as his legacy a project with a healthy start toward a DNA sensor.

"Essentially, I want to mimic biology to create synthetic systems with the same precision as a biological organism," McQuade explains when asked about his independent research goals. "Polymers that fold into synthetic enzymes and small molecular systems which organize into highly responsive sensors are two current targets." One project seeks to use DNA as a template for the synthesis of block polymers where each block is placed in a predefined position in the same way that a ribosome uses RNA to string up a series of amino acids to form a protein. The goal of this project is to create polymers that can fold into predictable geometries, creating active sites for catalysis or geometries for docking with other polymers to create highly organized materials. The project is multifaceted and requires the development of new chemical methodology and folding rules, and will use ideas and techniques from materials science and biology.

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New Process for Producing Near-Atomic Scale Silicon Structures—Nanobumps—Developed by Cornell Researchers

David Brand, Cornell News Service

An engineer and a chemist, working together on a corporately funded research project at Cornell University, are reporting a fundamentally new way to fabricate nanoscale structures on silicon that promises the development of devices ranging from biological sensors to light-emitting silicon displays.

The new process, called controlled etching of dislocations (CED), has produced an array of features on a silicon surface with tiny columns—the researchers call them "nanobumps"—just 25 nanometers across (about 75 atoms), six times smaller than the width of the most minuscule component of a commercial microprocessor. (A nanometer is equal to the width of 3 silicon atoms.)

The microelectronics industry uses optical lithography, essentially photographic reduction, to produce microscopic devices such as computer circuitry. But the technique is limited by the wavelength of light and, to date, commercial optical lithography has not been able to produce features smaller than 150 nanometers in width.

The Cornell researchers, Stephen Sass, professor of materials science and engineering, and Melissa Hines, associate professor of chemistry and chemical biology, believe that the new etching process will enable them to produce silicon structures as small as 10 nanometers, which is the distance between binding sites on a human antibody.

"We now have the tools to make very fine-scale surface features at the length scale of biologically important molecules, such as human antibodies," says Sass. "We would hope to develop properties and applications we can't even imagine today."

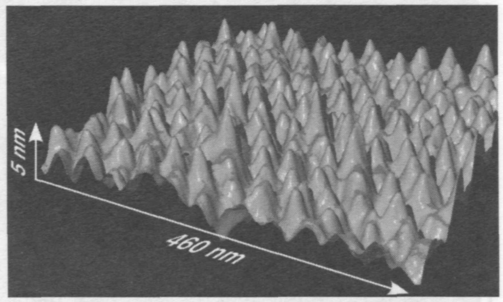
Sass and Hines note that a process based on CED can potentially produce tiny structures across an entire six-inch silicon wafer, suggesting that the technique can easily be scaled up for industrial production. "I like to think of this as creating nano-Lego surface structures, which ultimately we can build on to make a variety of devices," says Sass. The researchers reported their findings in the April 9 issue of *Applied Physics Letters,* a publication of the American Institute of Physics.

"This work provides an interesting new approach to creating arrays of periodic nanostructures on a semiconductor surface," comments Harold Craighead, former director of the Cornell Nanobiotechnology Center, where part of the research was performed. "If one can create large areas of precisely controlled objects, some of the problems associated with random sizes on depositions could be reduced."

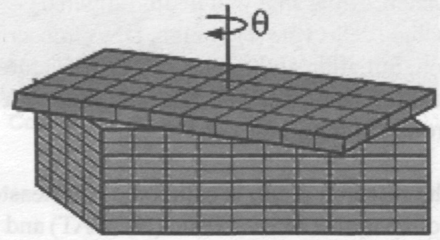
Sass notes that the theory behind CED has been known for a long time. In their process, two identical silicon wafers are twisted, one against the other, at a precisely controlled angle, and then are bonded together to make a bicrystal. Because of this twist angle, rows of atoms in the two wafers don't line up correctly. Only where the rows cross each other do the atoms line up and form strong bonds. The result is a repeating atomic scale mismatch that can be simulated by a moiré pattern.

Moiré patterns are common in everyday life and often occur when two repeating patterns overlap one another. They can be seen in folds of sheer curtains and in reflections of window screens. The atomic-scale moiré pattern created at the interface of the silicon wafers looks like a checkerboard. A QuickTime demonstration of the pattern can be seen online at www.chem.cornell.edu/mah11/Nanofab.html.

Sass has studied the interfaces between crystals—called grain boundaries—for 30 years. In some regions (the squares of the moiré "checkerboard"), the atoms line up correctly and, therefore, are strongly bonded.



After etching, the entire surface of the silicon bicrystal is covered by an array of "nanobumps." Above, an atomic force microscope image of a nanotextured silicon surface showing an average spacing between nanobumps of 38 nanometers, or 160 silicon atoms, and an average nanobump width of 25 nanometers, or 100 silicon atoms. (Courtesy Stephen Sass and Melissa Hines, Cornell. © Cornell University)



The process is based on the production of a "twist-bonded bicrystal" that is formed by bonding a very thin silicon crystal (represented in blue) to a thick silicon crystal (represented in gray). In this process, the two crystals are purposefully misoriented by an angle theta. (Courtesy Stephen Sass and Melissa Hines, Cornell University)

In other regions (the lines around the squares of the checkerboard), the atoms are poorly bonded. The twist angle controls the size of the checkerboard, so that large angles give small spacings, while small angles give large spacings.

Using a solution of chromium trioxide and hydrofluoric acid, the Cornell researchers etched away the lines of poorly bonded

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Cornell-Led Research Group Wins $19.6 Million NIH Grant to Build Biological Research Facility at Argonne's Advanced Photon Source

David Brand, Cornell News Service

A Cornell University–led research group comprised of 25 faculty members from six institutions has been awarded a $19.6 million, five-year grant by the National Institutes of Health to build a structural biology research facility at Argonne National Laboratory's Advanced Photon Source (APS). The amount of the first year's grant is $4.6 million.

The scientists believe that the results of their research will have an important impact on human health care, pharmaceutical development, and biotechnology. The goal is to apply the techniques of X-ray crystallography—firing a beam of X-rays through a crystallized protein sample to determine its structure—to the causes and treatments of human disease, including cancers and diseases of the immune system. Areas that will be investigated include cell-cycle regulation, DNA transcription, initiation and regulation, the structure and function of viruses and enzymes, and protein folding.

The research group is called the Northeastern Collaborative Access Team (NE-CAT) and consists of faculty from Cornell, Columbia University, Harvard University, Memorial Sloan-Kettering Cancer Center, Rockefeller University, and Yale University.

The APS is a third-generation particle storage ring built by the Department of Energy at a cost of nearly $1 billion and is one of the most powerful X-ray sources in the world. The NE-CAT facility is just one of 34 being developed at APS through scientific collaborations and one of only a handful to focus on biological research.

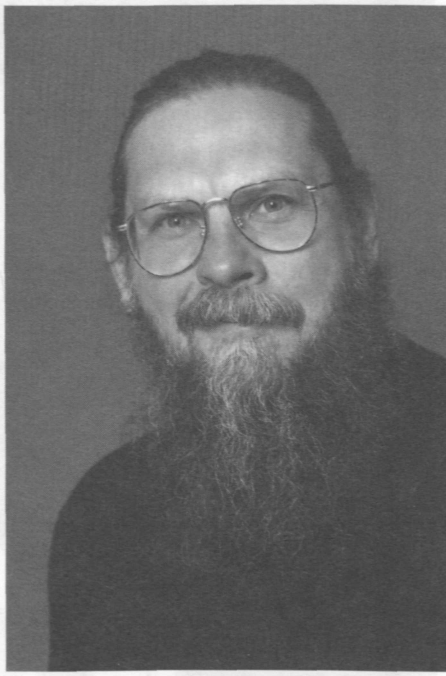
The goal of the consortium is to determine the atomic structures of very large molecules, or macromolecules, such as proteins. However, Steven Ealick, professor of chemistry and chemical biology at Cornell and NE-CAT's principal investigator and organizer, noted that "the real focus is on protein complexes, such as the ribosome." This is the site within the living cell where proteins are synthesized from RNA. Ealick also noted the focus on research into transcription complexes, which cause DNA to be transcribed into another strand of DNA or RNA, and signaling complexes, in which one molecule communicates with another by sending out a signaling molecule.

"Up to this point, crystallographers mostly looked at individual protein components. Now the focus is turning to looking at how these components assemble to perform their function," Ealick says.

This research will be conducted taking advantage of what Ealick describes as "the extra brilliance" of APS's beam lines for studying these large complexes. Brilliance—which is the intensity of X-rays emitted by atomic particles called positrons (they are the antiparticles of electrons)—is achieved through the use of devices called undulators. APS is the only synchrotron in the United States that can regularly use these magnetic devices, which produce huge intensity peaks in the X-ray beam spectrum. Other U.S. synchrotrons, such as the Cornell High Energy Synchrotron Source, use older high-intensity devices called wigglers.

Ealick said that one of the most important applications of synchrotron radiation that will be pursued at Argonne is multiple wavelength anomalous diffraction, known as MAD phasing. This is a powerful technique used to more accurately image a protein molecule from a crystal. It does this by extracting so-called phase data from X-ray patterns measured at several different wavelengths and by looking at the differences in intensity of those measurements.

In addition to the NIH funding, the NE-CAT project also will receive $6.6 million from member institutions and $1.5 million from the APS. The sector will be developed in three phases, with the first X-rays expected about a year after the start of construction.



Steven Ealick

Charles Harrington/University Photography

"We are very optimistic that some really important structural biology will come from all this," says Ealick. In addition to structural biology, the team's biomedical research, he says, will involve cancer biology, immunology, and virology, as well as the basic disciplines of biochemistry, cell biology, molecular biology, and biophysics.

Each of the 25 researchers involved in NE-CAT heads a research group, which together include several hundred graduate students and postdoctoral research fellows who are training for careers in the biological sciences. Besides Ealick, Cornell researchers involved in the project are Jon C. Clardy, the Horace White Professor of Chemistry and Chemical Biology, and assistant professors of biochemistry Christopher Lima and Hao Wu, both at Weill Cornell Medical College.

New Class of Rubbery Plastic Materials, with Promise of Big Economies, Produced in Lab by Cornell Researchers

David Brand, Cornell News Service

An entirely new class of rubbery plastics has been produced in the laboratory by a Cornell University researcher and two co-workers. Because the material uses two common and inexpensive petroleum products, ethylene and polyethylene, for its feedstock, the research has the promise of greatly reduced production costs.

The development is the result of a chance discovery by Geoffrey Coates, associate professor of chemistry and chemical biology, of a long-sought catalyst that enables the new polymer to be "grown" from molecules of ethylene and propylene. A catalyst—in this case, based on titanium—is a substance that increases the rate of chemical reaction without itself changing chemically.

"We didn't predict this. It was an example of serendipity," says Coates.

Because ethylene and polyethylene, the two so-called monomers, or substrates, used in the process, are among the least expensive on the market, "we anticipate that these new polyolefins will be dramatically cheaper," says Coates.

He reported the research results April 3, 2001 at the national meeting of the American Chemical Society at the San Diego Marriott Hotel. Coates's paper is coauthored by Cornell graduate student Phillip Hustad and postdoctoral researcher Jun Tian.

The material produced in Coates's lab falls into a class of compounds called thermoplastic elastomers that, unlike most rubbers, have properties that allow them to be melted and recycled. The rubbers in this class most widely used today are polymers made from styrene and butadiene, two relatively expensive chemicals. Uses of materials in this class, which are made by Kraton Polymers, range from roofing to adhesives to shoe soles.

The hallmark of such rubbery polymers is that they are made by a "living polymerization process," a technique that literally grows molecules in connected monomer blocks, and can, in theory, endlessly enchain monomers to yield chains of equal length. In the case of the styrene-butadiene polymer, the material is made of three-block strands: the first block, the hard polystyrene; the second, the liquid polybutadiene; and the third, the polystyrene. This combination of soft and hard molecules gives the material its elasticity. It can be injection molded, melted, and recycled.

Coates likens this so-called "sequential addition of monomers" process to a pasta machine turning out long strands of spaghetti, then linguine, then spaghetti again—all connected. The trick, he says, is to use a catalyst that allows the pasta to continue these links without breaking.

Researchers have long reasoned that a lower-cost living polymerization process should be possible with ethylene and propylene if a catalyst could be found. For the past five years, in particular, the search for such a catalyst has been intense. But every new catalyst failed to enable the "living" process to achieve the continuous growing of molecular blocks without breaking the chains.

Coates's titanium catalyst used in the creation of the Cornell rubbery polymer begins with propylene in a hard form called syndiotactic propylene. This block is then joined to a second, much softer, block of an ethylene-propylene copolymer. The third block is again the syndiotactic propylene. This "very complicated polymer," says Coates, "has the properties of standard Kraton polymers, but has the advantage of being made from especially cheap materials—ethylene and propylene."

Geoffrey Coates

One particular asset of the new polymer, he says, is that by "tailoring" the size of the blocks in the strands, the plastic can be changed from a tough rubber to a gum elastomer, or soft rubber. "To make the material more pliable, we can make the soft block bigger, and to make it harder, we would have more of the hard block," he says.

Why hasn't this been achieved before? "There is no way to rationally predict the action of compounds," says Coates. "We simply stumbled across this, luckily with our eyes open."

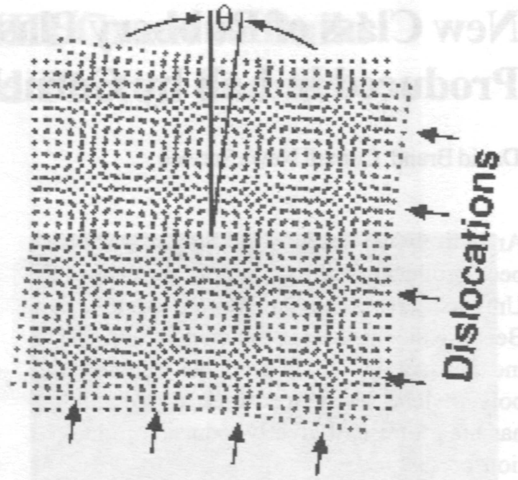
Nanobumps, continued from page 5

atoms, which are called dislocations, and produced an array of nanobumps. To prove their concept, the researchers fabricated a test structure with nanobumps that were approximately 100 atoms (25 nanometers) in diameter and 160 atoms (38 nanometers) apart. (See image page 5.)

Sass and Hines calculate that if a silicon bicrystal were fabricated with a twist angle of 4 degrees, in principle, nanobumps just 5.5 nanometers in width, or about 20 atoms, could be created.

In fact, it is not the width of the nanobumps that matters so much as the distance between them. Because this spacing decreases as the twist angle of one silicon crystal relative to the other increases, says Sass, an angle of 10 degrees would produce a distance between nanobumps of only two nanometers (about 6 silicon atoms), "although we really don't know what the limit of this technique is." Nanofabrication at these near-atomic length scales has many potential applications, says Hines. The new technique potentially opens the door to manufacturing at biological dimensions because many molecules, such as human antibodies, have features on a similar scale. Other technology possible with CED, says Hines, might be light-emitting silicon devices. Normally silicon does not emit light. But in microscopic fragments of silicon, electrons are confined and travel in a way that allows them to emit light. "That might mean that you could make a flat-panel display for a computer out of the same stuff you use to make the computer itself," she says.

In addition, magnetic material could be deposited on the nanobumps to create a high-density data storage medium. "Experience has taught us one thing, though. Every time we have learned to machine at a smaller length scale, new applications have emerged. And they have never been the actual applications we originally dreamed of," Hines says.



A twist-bonded bicrystal is formed by bonding two silicon crystals, misoriented at an angle. On the atomic scale, this misorientation produces a mismatch between the atoms in the crystals. If we were able to look down on the interface between the two crystals, the atoms would resemble the sketch above. The misaligned areas form a square grid, or moiré pattern. Chemically speaking, these misaligned regions correspond to dislocations, or lines of poor chemical bonding. (Courtesy Stephen Sass and Melissa Hines, Cornell. © Cornell University.

Chirik, continued from page 3

Chirik maintains that the overall philosophy in his group is to tackle industrially relevant problems with the rigor and thoroughness typically encountered in an academic environment.

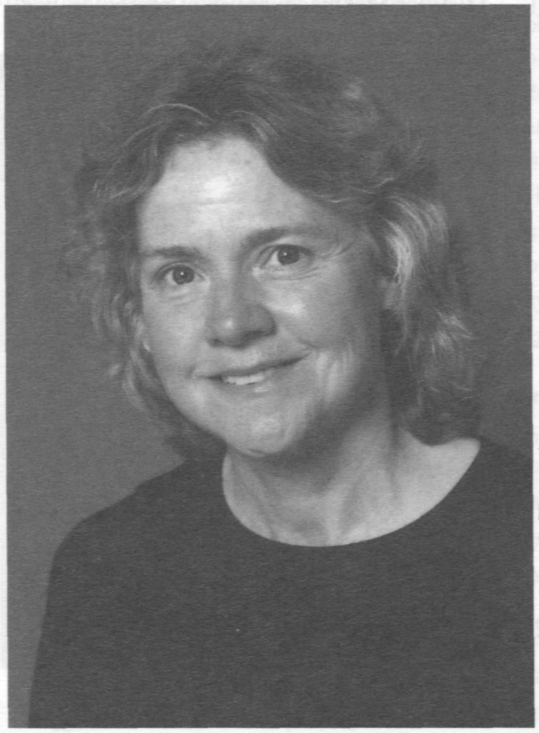
"We not only want to make new and improved transition metal catalysts, we also want to understand both how and why they do what they do," he adds. With this approach, he feels that his students and postdoctoral associates will be well prepared for any career path they choose. Chirik feels Cornell is an ideal setting for his group because the campus is rich with potential collaborators and also provides programs such as the Polymer Outreach Program that seeks to bridge the gap between academic and industrial scientists. This fall Chirik is teaching Advanced Inorganic Chemistry (605), but he is also looking forward to becoming involved in undergraduate courses, such as freshman chemistry, in the future.

McQuade, continued from page 4

"Taken en masse, this project might seem daunting," says McQuade. "But I have broken the task into graduate student career-sized pieces, where many students will work on a specific aspect of the project. Eventually these stand-alone, academically interesting pieces will come together as a cohesive whole to meet our overall goals."

Barbara Baird, a Leading Investigator of Allergic Reactions, Named Director of Cornell's Nanobiotechnology Center

David Brand, Cornell News Service



Charles Harrington/University Photography

Barbara Baird, a leading researcher in the allergic immune response system at the molecular level, has been named director of Cornell University's Nanobiotechnology Center (NBTC). She succeeds Harold Craighead, who has been named interim dean of the Cornell College of Engineering. The appointment is effective July 1.

Baird, who has been a full professor in the Department of Chemistry and Chemical Biology at Cornell since 1991, says she hopes to bring to the NBTC a combination of steady progress in those systems that are well understood with bold experimentation in riskier areas.

"We have the latitude to do risky things while moving ahead more slowly on the solid parts," says Baird. "I think that's critical in providing the best possible contribution to biology."

NBTC was established at Cornell in January 2000 with a five-year, $19 million grant from the National Science Foundation. The center, the only one of its kind in the nation, brings together biologists, engineers, materials scientists, physicists and chemists to work at the "nano" scale (as small as a few billionths of a meter) to invent hybrid devices combining the organic with the inorganic to advance research in molecular and cell biology. As the home of NBTC, Cornell leads a research consortium that includes Princeton University, Clark Atlanta University, the Wadsworth Center of the New York State Department of Health, Howard University, and Oregon Health Sciences University.

Baird's laboratory, which she co-directs with her husband, David Holowka, a physical biochemist, has for more than two decades been studying the general mechanism of allergic immune response. In particular, the couple's research has focused on the cell surface receptor for immunoglobulin E, called the IgE receptor, which plays a central role in the allergic immune response.

"If you are an allergic individual, you become allergic because you are exposed to certain molecules in the environment, such as pollen or cat dander. The immune response operates by causing the generation of a class of antibodies, IgE," says Baird. These antibodies have receptors that bind both to the cell—thus sensitizing the cell—and to the invading allergen. The next time a molecule of pollen or dander invades, the cell is ready to respond.

Baird and Holowka's research into how the antibody stimulates the cell to respond, thus setting off a whole variety of biochemical pathways in the cell, has produced a broad range of research into what triggers an allergic reaction. The researchers have found that the binding action of IgE causes the synthesis of leukotrines and prostaglandins, molecules released by the cell and the cause of inflammatory responses. They have also found that storage granules in the cell fuse with the plasma membrane and release their contents, one of which is histamine. This causes rhinitis (runny nose), itchy eyes, and other symptoms of allergy.

Baird's interest in nanobiotechnology was stimulated by the promise of finding new tools to bring to bear on biological problems.

"If we could develop tools at the same length scale as molecules, we could measure and manipulate them. That drew me in," she says. For example, she notes, an antibody has the function of "recognition." If that same molecule could be placed inside a device, the device itself could perform the same functions of binding or linking to other molecules.

Baird was born in Decatur, Ill., and received her B.A. degree in 1973 at Knox College. She earned both her M.S. (1975) and her Ph.D. (1979) in chemistry at Cornell. She was named an assistant professor at Cornell in 1980, following a postdoctoral fellowship at the National Institutes of Health (NIH), and an associate professor in 1986. She received the Harold Lamport Award for Biophysics and Physiology from the New York Academy of Sciences in 1988, a faculty award for women in science and engineering from the National Science Foundation in 1991 and a fellowship from the John Simon Guggenheim Memorial Foundation in 1993.

She is co-director, with Frederick Maxfield, professor of biochemistry at Weill Cornell Medical College, of the W. M. Keck Program in Cellular and Molecular Biophysics of Signal Transduction. She also is program director of molecular biophysics for an NIH-funded training program at Cornell for graduate students in biophysics.

Geoffrey Coates Receives Arthur C. Cope Young Scholar Award

Geoffrey Coates, associate professor, has received the 2001 award established in 1984 by the ACS Board of Directors, on recommendation of the ACS Division of Organic Chemistry, under the terms of the will of Arthur C. Cope. The Cope Scholar Awards are supported by income from the Arthur C. Cope Fund administered by ACS to recognize and encourage excellence in organic chemistry.

Paul Houston Awarded 2001 Herbert P. Broida Prize

The American Physical Scoeity awarded Paul Houston the 2001 Herbert P. Borida Prize for his critical contributions to the investigation of vibrationally and rotationally resolved molecular photodissociation and reaction dynamics, in particular the invention and development of the photofragment ion imaging method. He shares the prize with David W. Chandler from Sandia National Laboratory.

D. Tyler McQuade Receives Dreyfus Award

D. Tyler McQuade, assistant professor, has been named the recipient of a 2001 Camille and Henry Dreyfus New Faculty Award. The Camille and Henry Dreyfus New Faculty Awards Program was established in 1979 to provide funding for new faculty members at the start of their research and teaching activities.

Acclaimed Neurologist and Author Dr. Oliver Sacks Visited Campus as Newly Appointed A.D. White Professor-at-Large Sept. 9-20

Excerpted from the Cornell News Service

Dr. Oliver Sacks, neurologist and author of *Awakenings* and *The Man Who Mistook His Wife for a Hat,* held two lectures among other events during his first campus visit to Cornell University as an Andrew Dickson White Professor-at-Large, Sept. 9-20.

Sacks, whose engaging literary voice is an artful blend of hard science and profound human feeling, participated in a Knight freshman writing seminar in which his book on deafness, *Seeing Voices,* is required reading. He discussed monsters in Greek mythology in a classics course and also participated in cognitive neuroscience and clinical neurobiology classes. In addition, Sacks visited plant science and veterinary college laboratories while on campus.

"What can one say of one of the great writers of our time? Oliver Sacks humanizes illness ... he writes of body and mind, and from every one of his case studies there radiates a feeling of respect for the patient and for the illness," said Roald Hoffmann, Cornell's Frank H.T. Rhodes Professor of Humane Letters and professor of chemistry, who was the faculty sponsor for Sacks. "What others consider unmitigated tragedy or dysfunction, Sacks sees — and makes us see — as a human being coping with dignity with a biological problem."

On Sunday, Sept. 9, at Willard Straight Theatre, Cornell Cinema hosted a screening of *Awakenings,* the Oscar-nominated movie starring Robin Williams and Robert De Niro. *Awakenings* is a Hollywood rendition of Sacks' extraordinary stories about his original post-encephalitic patients who were "awakened" by the drug L-dopa in the summer of 1969 after decades spent in semiparalysis. These patients were survivors of a worldwide outbreak of "sleeping sickness," an epidemic that lasted from about 1916 to 1927.

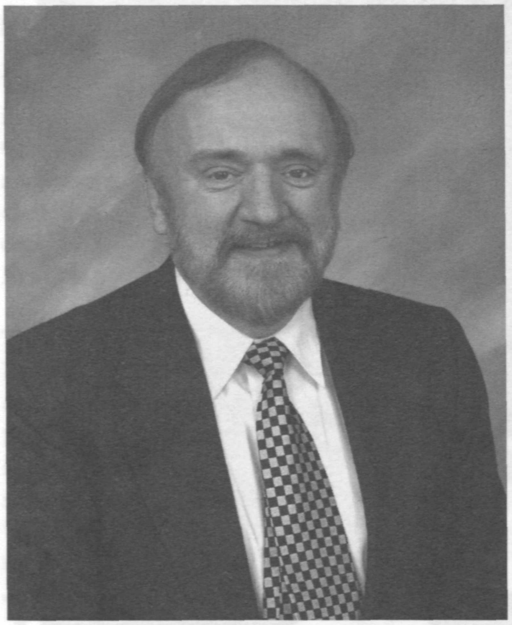
Other events during Sacks' visit included a lecture in Statler Auditorium, "Neurology and the Soul: The Real 'Awakenings.'" The lecture included a screening of the original "Awakenings," a 40-minute documentary film made for British television in 1973. The Department of Chemistry and Chemical Biology sponsored his lecture on Thursday, Sept. 20, "Uncle Tungsten: Memories of a Chemical Boyhood." The topic is the subject of Sacks' next book, a memoir describing his childhood love of chemistry, to be published in October 2001.

The son of two physicians, Sacks was born in London and received his medical degree at Oxford University. In the early 1960s, he moved to the United States, where he completed an internship at University of California-San Francisco and a residency in neurology at UCLA. Since 1965, he has lived in New York, where he is clinical professor of neurology at the Albert Einstein College of Medicine, adjunct professor of neurology at the New York University School of Medicine and a consultant neurologist to the Little Sisters of the Poor and at Beth Abraham Hospital.

Sacks began working in 1966 as a consulting neurologist for Beth Abraham, where he encountered an extraordinary group of patients, many of whom had spent decades in strange, frozen states, like human statues, unable to initiate movement. They became the subjects of his book Awakenings (1973), which later inspired a play by Harold Pinter, A Kind of Alaska , and the Oscar-nominated Hollywood movie, Awakenings . Sacks gained international acclaim for his 1985 collection of intriguing neurological case histories titled The Man Who Mistook His Wife for a Hat . In 1989, he received a Guggenheim Fellowship for his work on what he calls the "neuroanthropology" of Tourette's syndrome, a condition marked by involuntary tics and utterances. He has received numerous awards and prizes, is a member of the American Academy of Arts and Letters and his seven books have been translated into 22 languages.

Fall 2001 Baker Lectures

Jean M. J. Fréchet, Professor of Chemistry at the University of California, Berkeley, will deliver the Fall 2001 Baker Lecture series titled "Design and Applications of Functional Macromolecules" in October and November.



Professor Fréchet was born in France and received his first university degrees at the Institut de Chimie et Physique Industrielles in Lyon, France, before moving to the USA for graduate studies in organic and polymer chemistry in Syracuse. He started his academic career at the University of Ottawa in Canada in 1973 where he also acted as vice dean of graduate studies and research from 1983 to 1987. He then joined the Department of Chemistry at Cornell University in 1987, first as the IBM Professor of Polymer Chemistry and later as the holder of the Peter J. Debye Chair of Chemistry at Cornell University. Since 1997 he has been professor of chemistry at the University of California, Berkeley, and heads the Polymer Program at the Lawrence Berkeley National Laboratory.

Fréchet's research centers on functional macromolecules, their molecular design, their synthesis, and their applications. His early work focused on reactive insoluble polymers and their use as chemical reagents, supports, or catalysts. In collaboration with Grant Willson of IBM, he then pioneered the chemical amplification approach that has become the basis of the design of all modern photoresists for microelectronics. At Cornell he initiated a successful program aimed at designing macromolecules with controlled architectures, leading to many advances in the chemistry and applications of dendrimers. His current research at Berkeley is at the interface of chemistry, materials science and biology, from fundamental concepts to synthetic and analytical methods, to practical applications.

Fréchet was elected to the National Academy of Sciences, the National Academy of Engineering, and the American Academy of Arts and Sciences. He is the co-author of over 500 publications and 60 patents, several of which are exploited commercially.

A. D. White Lectures

Richard Ernst, a 1991 Nobel laureate in chemistry and professor emeritus at the Swiss Federal Institute of Technology in Zurich, revisited the department in September and October, 2001, delivering the A. D. White Professors-at-Large lecture series.

Lectures took place on Monday, September 24: "Fourier Transform Concepts in Spectroscopy: From Monsieur Fourier to Medical Imaging;" Sunday, September 30: "How Can a Rational Scientist Become Fascinated by Irrational Tibetan Art?;" Monday, October 1: "Science and Our Future: The European and American Challenges;" and Thursday, October 4: "Frontiers of NMR."

Ernst, the co-author of *Principles of Nuclear Magnetic Resonance in One and Two Dimensions* (often referred to as the "New Testament of NMR"), is the recipient of many honors, including numerous honorary doctorates and the Wolf Prize for Chemistry, the Ampere Prize, and the Benoist Prize.

The A.D. White Program for Professors-at-Large began in 1965 to bring distinguished scholars to the Cornell campus for formal and informal exchanges with faculty and students. Up to 20 professors-at-large are named at Cornell at any one time. They make periodic visits to campus over six-year terms and are considered full members of the Cornell faculty. Their efforts enrich the lives not only of faculty but of students; in addition to giving public lectures, professors-at-large participate in office hours, seminars, and thesis consultations with undergraduate and graduate students.

Oxygen in Europe!

Carl Djerassi's and Roald Hoffmann's play *Oxygen* will open this fall in London and in Germany (in German of course!). For a description of this witty and thought provoking play about priority and competition in science, see our earlier article in Newsletter 73. Or read about it on Djerassi's web site: www.djerassi.com.

The U.K. performances will begin with three previews in a very special place, the Royal Institution, 21 Albemarle Street, London, on October 27, 28, 29, 2001 (tickets via Rachel Handbury, 20-7409-2922, rhandbury@ri.ac.uk).

The play will then open for a three week run at the Riverside Studio, Crisp Road, Hammersmith, London W8, Wednesday, November 14 through Saturday, December 1 (evenings at 8, Saturday matinees at 3). Box Office: 20-8237-1111.

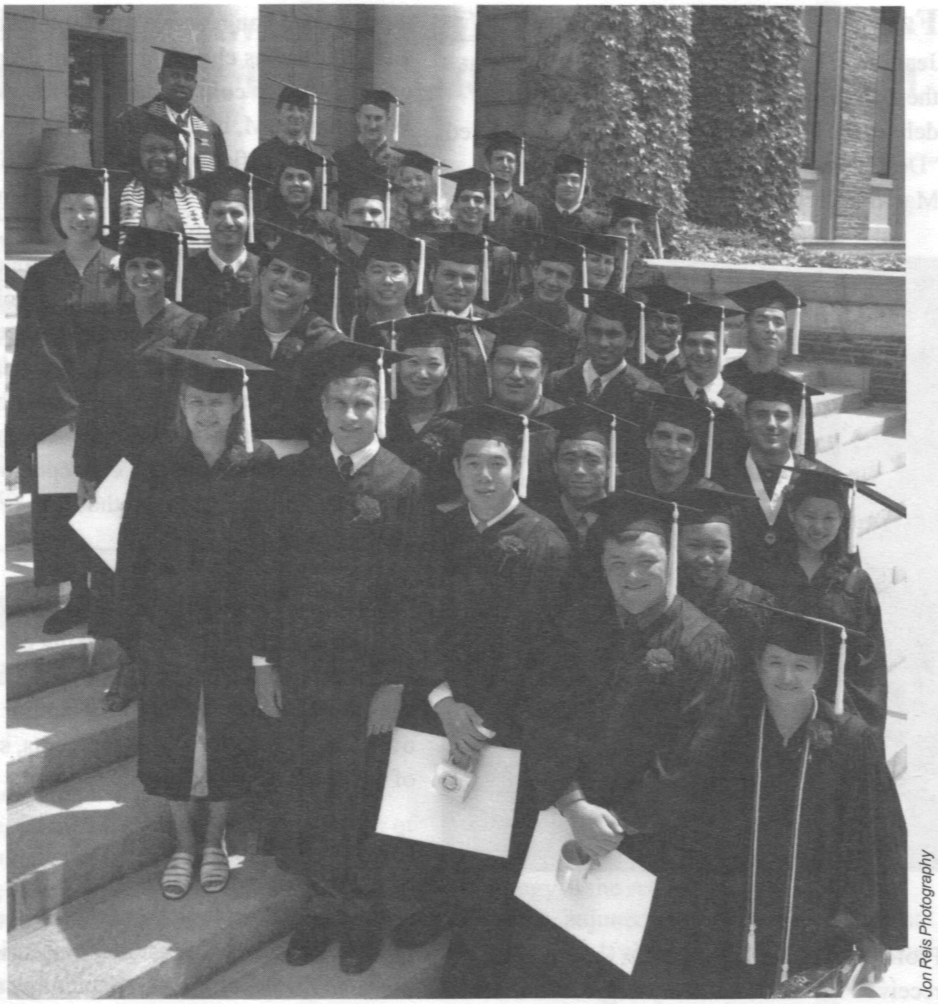
The German performances were at the Würzburg Stadttheater Kammerspielen, September 23-29, and will be in repertory, October 3, 4, 10, 20, 27; November 6, 14; December 8, 22; January 12, 20; February 2, 17; March 3, 16; April 6, 2002. Box Office: 49-931-3908-124 or 123.

On November 23, 24, and 25 there will also be guest performances of Würzburg Theatre at showings at the Deutsches Museum in Munich at 8:00 pm.

Any alumni near these venues are cordially invited!

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 27. The departmental ceremony and reception followed the 133rd all-university commencement at Schoellkopf Stadium.

The new graduates were presented their diplomas by Professor and Interim Chair Bruce Ganem who gave a speech entitled "Made at Cornell."


Jon Reis Photography

Class of 2001

August 2000 Graduates

Robin Michael Chan, Juan Zurita

January 2001

Brian Patrick English, Kiran Guthikonda, Amanda Rhea Kost, David H. Salzman, Michael F. Walton, Sean Howard Wiedemann

May 2001

Jennifer Adamchuk, Melissa Louanne Allard, John Everett Allen, Adolfo Alvino, Elora Basu, Adam Brian Braunschweig, Scott W. Calcagno, William Wei-Chung Chang, Leon David Charkoudian, Karen Elizabeth Cole, Jason James Dummer, Robert Francis Eaton, Ihab Shaker Ghattas, Anthony Michael Heckmann, Yeu Min Hong, Santosh S. Kale, Pakorn Kanchanawong, Peter-Donat Michael Kazarinoff, No Bong Kwak, David Alvin Lee, Dennis H. Leung, Sirinya Matchacheep, Jonathan Scott Melnick, Elaine L. Moy, James Francis Murdica, Kenneth Ryan Myers, Catherine Elaine Napjus, Joseph James Reczek, Cha-Chi Ren, George Eric Sclavos, Neha Priyavadan Shah, Alexander Spektor, Ekundayo Nigel Julian Spencer, Jennifer Huyen Ta, Hsien-Kai Tan, Tameka Renee Walker, Douglass Wu

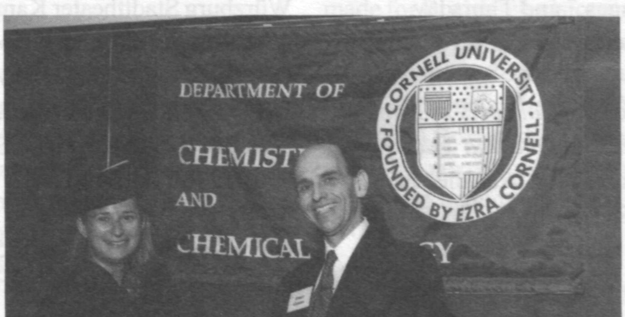
Graduating with Honors

Magna Cum Laude

Robert Francis Eaton, Santosh S. Kale, David Alvin Lee, Sirinya Matchacheep, Jonathan Scott Melnick, Sean Howard Wiedemann

Cum Laude

Jennifer Adamchuk, Joseph James Reczek, Alexander Spektor, Tameka Renee Walker



Cum laude graduate Jennifer Adamchuk receives her diploma from Bruce Ganem.

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 2001 recipient, **Pakorn Kanchanawong,** is planning to attend Stanford University.

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 2001 recipients were **Robert Francis Eaton** and **Brian Patrick English.**

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 2001 recipient was **Jonathan Scott Melnick.**

The American Institute of Chemists Medal is presented to an outstanding graduating senior who has a demonstrated record of leadership, ability, character, and scholastic achievement. The 2001 recipient was **Sean Howard Wiedemann.**

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 2001 recipients were **Jennifer Adamchuk** and **Joseph James Reczek.**

The Harold Adlard Lovenberg Prize was established in 1939 with a gift from Mr. Oscar R. Lovenberg and is awarded annually to a member of the junior class with a major in chemistry who has shown general excellence. The 2001 recipient was **Yelena Koldobskaya.**

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, **Jason Hill,** 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 2001 recipients were **Adam Bodzin** and **Amy Yang.**

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 2001 recipients were **Jennifer Elges, Yvonne Leung,** and **Eric Margelefsky.**

Graduate Diplomas and Awards

August 2000 Graduates

Ming Cheng
Wingfield Glassey
David Horn
C. Frederic Huntley
Theresa Newton
Kevin Proctor
Jennifer Rutherford
Sean Smith
Brian Strazisar
Stephanie Strazisar
Joseph Tanski
Ying Wang
Marc Weimer

January 2001 Graduates

Pamela Arnold
Kwang-Hwi Cho
Urmila Deo
Arifa Husain
Lori Rayburn
Benjamin Sandler
Ryan Schoenfeld
Xiufeng Sun
Amanda Sutton
Melissa Wagenaar

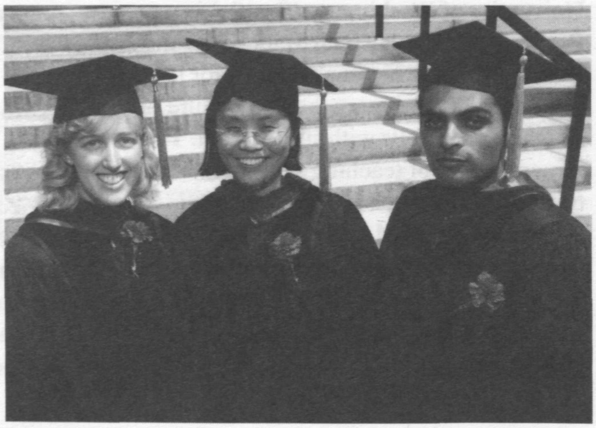
May 2001 Graduates

Jae Lee
Jason Reddick

The DuPont Teaching Prizes 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 2001 were **Daniel Baird, Yutan Getzler, Neil Jenkins, Ellen Scheuer,** and **Carrie Stearns.**

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 2001 was **Robert Neuman.**

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. Prizewinners present their research findings at a symposium held in the spring. The 2001 recipient was **Ryan Williams.**



PhD graduates Tina Ovitt, Jae Lee, and Osman Rathore.

News From Alumni and Friends

Kelvin H. Ferber, BChem '32, MBA SUNY at Buffalo: "Born 10/18/10. Married to Renette Bernhard (1937), who died March 2000 from late-onset Alzheimer's Disease. Naturally, I am interested in the fast-developing molecular biology, genetics, and psychiatric pharmacology of A.D. Pleased to see that Cornell will be a leader in biological chemistry and chemical biology. I presume Cornell will make important use of the Human Genome Database. . . .My senior research project consisted mostly of making carbon from sucrose plus H_2SO_4 and breaking 12-liter flasks."

Irene L. (Pretzer) Pigman, MS '47: "I was at Cornell during the war years. As the men were drafted, women came to take their place. I worked with Al Blomquist on insecticides—weapons to use against malaria—very smelly. We had the run of Baker Lab from the sub-basement, where WWI glassware was still stored, to the roof. We shared our lunches cooked over Meeker burners. We passed on the legions—had Christmas parties with a tree trimmed with Ag plated glassware. Prof. Blomquist had a support group for the men. No women were ever invited! Eleanor Weller Aggarwal was a good friend."

Michael D. Colloms, AB '59: "After AB '59 worked on PhD in molecular biology parallel to activity in FSM, civil rights, and anti–Vietnam war movement. PhD 1966, University of California, Berkeley. Thesis on structural modifications of TMV protein by chemical methods. Next four years as a postdoc, two in Ben Papermaster's labs in the Immunology Department at Berkeley, two further years at University of Washington (Seattle) in Biology. In Berkeley with Mark Saifer tried to isolate a specific messenger RNA for IqG synthesis. In Seattle worked on culture of salivary gland cells with similar goal. Then turned to school teaching with occasional time off for research at University of Edinburgh lab of M. Masters. There I worked on characterization of the *E. coli* pen gene. Just retired from ASL High School chemistry and science teaching June 2000."

A. William Johnson, PhD '57: "Following retirement from the University of North Dakota as professor of chemistry and dean of the graduate school, I wrote and had published by Jones and Bartlett Publishers of Sudbury, Mass., a text for the one-semester organic chemistry course usually taught at the sophomore or junior level for nonchemistry majors. It has been adopted at many higher education institutions. Title: *Invitation to Organic Chemistry* (ISBN: 0-7637-0432-6)."

Elmer E. Schallenberg, AB '51: "Spent a brief period before and immediately after graduation as an assistant in the research group of Prof. A. T. Blomquist. Subsequently enrolled in the PhD program in the Department of Chemistry, University of California, Berkeley as a research assistant in the bio-organic group of Prof. Melvin Calvin. Received the PhD in September 1954, based on research in the field of peptide chemistry. In 1954, joined the Research and Technical Department of Texaco Inc. at the Beacon (N.Y.) Research Laboratories. Began Texaco career in lubricant additive synthesis and product development, followed by staff positions and culminating in assignments in the company's European operations. Retired in January 1991 from Texaco Services Deutschland GmbH, Hamburg, Germany. Now, my wife and I spend about three months of each retirement year in Switzerland. Our daughter, Heidi (Cornell '80), received her JD from New York University School of Law in 1986 and is presently a homemaker, rearing our two grandsons. Our son, Eric (Cornell '82), is an account director with Grey Advertising in Geneva, Switzerland."

Anthony G. Tappin, AB '50: "When I returned from WWII, I knew I wanted to get into the chemical business. I majored in chemistry and took all the electives I could to enhance my education and career in marketing in the chemical industry. . .these included business law, accounting, economics, management, and business administration. I joined FMC Corporation in their chemical division as a sales trainee and progressed over some 47 1/2 years to corporate vice president of marketing for the corporation, which included 25 divisions—worldwide operations and marketing of machinery and chemicals for industry and agriculture. After 20 years, I was director of marketing for Industrial Chemical Division and I was selected to attend Harvard Business School's Advanced Management Program of 13 weeks of intensive education, which put me in a position to understand and challenge the new generation of MBAs. To my knowledge, there is no program in place at Cornell to help and encourage students who want to enter the chemical industry in disciplines other than research, engineering, and teaching. I recommend this be corrected by getting qualified faculty members to advise students of the opportunities in marketing within the chemical industry."

David M. Bridgeman, AB '65: "I retired in 1998 due to health concerns, following a very enjoyable 28-year sales career in the chemical industry. Worked for four other chemical giants, but finally achieved my goal of working for the Dow Chemical Company, where I spent my last 10 years selling epoxy vinyl ester resins out of sales offices in Atlanta, Houston, and Los Angeles."

Susan Boettger, PhD '79: "postdoctoral position, University of Rochester Chemistry Department, A. Kende, adviser, 1979–81. Bristol Myers Squibb Co., Syracuse, N.Y., from 1981 to present. Process development chemist, cGMP supervisor, manager."

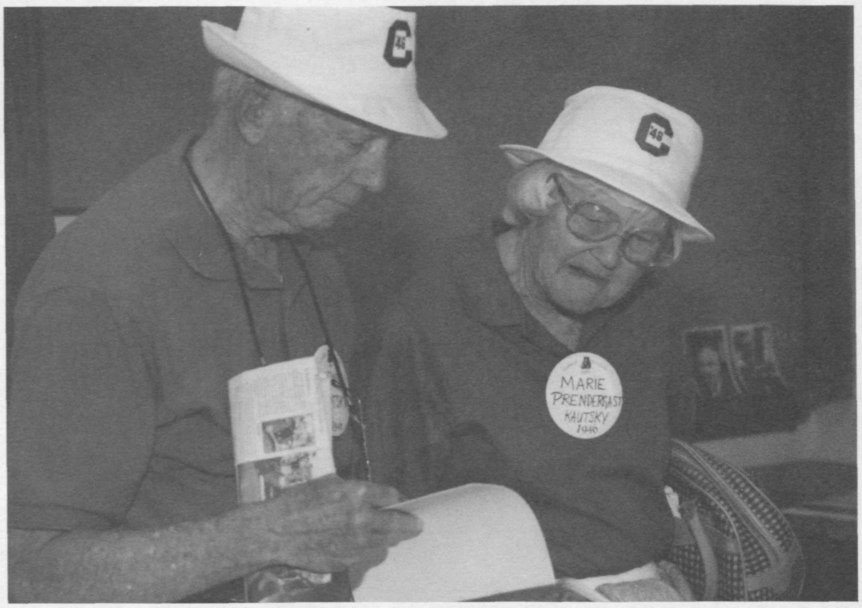
Jerome J. Solomon, PhD '72, is deputy director of the Department of Environmental Medicine and Environmental Carcinogenesis Program leader.

In Memoriam

Arthur Neubauer, MA '33, January 3, 2001

Daniel Scott Sears, PhD '43, January 26, 2001

Jeff Carver AB '91, left, always stops by on a reunion year to see the displays and chat with faculty.



Marie Prendergast Kautsky, BA '46 and her husband, Norman L. Kautsky, look through the memorabilia.

Carlene Dyke Ludlum AB '52 greets an old friend, W. Bradford Bond, AB '51

On Friday, June 8, the Department of Chemistry and Chemical Biology hosted an open house for returning alumni and friends in the faculty lounge of Baker Laboratory.

The tables in the lounge were filled with memorabilia to reminisce over and refreshments to replenish energy for walking around campus.

Photos by John Reis Photography

The Society of Cornell Chemists asks you to support the cost of printing and mailing this newsletter with your voluntary annual dues of $25. Please make your 2001 check payable to "Cornell Chemistry" and mail it to the Society of Cornell Chemists, Baker Laboratory, Department of Chemistry and Chemical Biology, Cornell University, Ithaca, New York 14853-1301.

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Cornell University
Department of Chemistry
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Baker Laboratory
Ithaca, NY 14853-1301