Chemistry and Chemical Biology

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The Chairman's Notebook

A New Building in Our Future?

Our department's intention to grow in the area of chemical biology and to fill vacant lines in more traditional areas of chemistry brings with it two important commitments. The first is the need to attract many new faculty to the department and to hire them in areas that are both exciting and synergistic. Over the next five years we anticipate making nine appointments, roughly four in traditional areas of chemistry and five in chemical biology. Three of these positions will replace retiring members of the faculty. We have just finished the interview process this year, and I hope to report on our successful recruitments in our next newsletter.

The second major commitment is to new research space. We cannot increase our numbers by nearly 25 percent without augmenting the quantity and quality of our research laboratories. Furthermore, we have important space needs in other areas that influence undergraduate teaching and the spirit of departmental community.

Over the past year we have been meeting with Wilson Architectural Associates of Boston to determine our needs and to propose a building plan that can address them. Although their recommendations have not yet been officially approved, it is clear that our needs cannot be met without a plan that provides both substantial renovation of Baker Laboratory and a new building designed primarily to address the research needs of chemical biology.

By the determination of our architectural advisors—based on projected faculty size, group size, and current laboratory standards for research space—we need both to renovate 114,000 square feet of existing space at a cost of about $55 million and also to create 93,000 net square feet of new research laboratories, again at a cost of about $55 million.

Because it is clear that our needs outstrip our projected resources, we have worked strenuously with the architects to develop a $54.4 million building plan that Cornell might be able to afford. Of course, it postpones some of the department's needs, but it does address our most serious concerns. The plan we propose meets all of our requirements in chemical biology, in which new laboratories are required to attract young faculty in this area. It meets roughly one-third of our need in other areas of chemistry and allows renovation of a few key laboratories and modest expansion for the most crowded groups. Substantial funds are included to increase the number of undergraduates in our research laboratories. The undergraduate organic teaching laboratories will be renovated and provided with additional hoods, although we will need to postpone renovation of other teaching laboratories. A new 250-seat classroom is proposed to take a substantial load off our overused Baker 200 auditorium. Finally, about 60 percent of our infrastructure needs (e.g., plumbing and electricity) will be met by the new plan, and we will have a bright new atrium to act as a communal focus.

Most controversial, of course, is the siting of the new building, and several options have been presented. Whatever the outcome, it is clear that the new structure must be contiguous with our current research facilities. While concentrating chemical biology in the new facility to some extent, it is our plan to spread subdisciplines throughout the three buildings so that they do not become isolated from one another. Placement of communal resources such as the mailroom and the copy machines has received very careful consideration. The more we learn from our architectural consultants, the more we realize that the sociology of a chemistry building is as important as the chemistry!

The proposed schedule of course depends on approvals and successful fund-raising, but it is conceivable that we could start the renovation of some parts of Baker as early as next Thanksgiving. We would then break ground on the new structure sometime in late 2001 and complete it by mid-2003. Further renovation of Baker would take place in a final stage, after we move some faculty to the new structure.

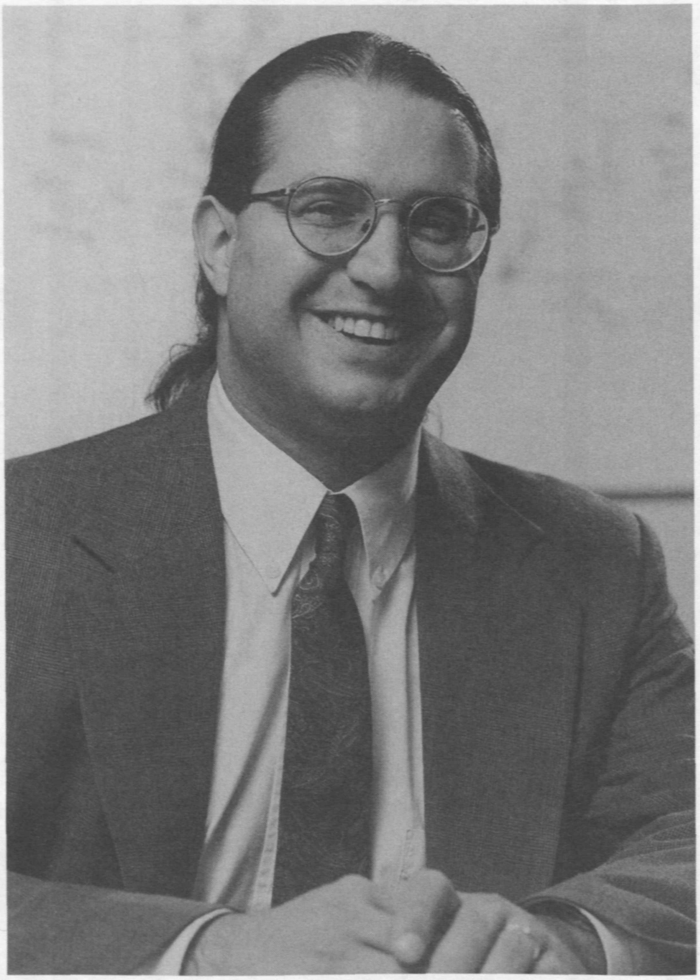
We anticipate an exciting and busy next few years, and we look forward to your support as we improve the future of chemistry and chemical biology.

John Marohn Joins the Department as an Assistant Professor

John A. Marohn, a native of Buffalo, New York, obtained a BS degree in chemistry and a BA degree in physics from the University of Rochester in 1989. He received a PhD in chemistry from the California Institute of Technology in 1996. His thesis work, under the direction of Daniel P. Weitekamp, investigated the properties of the solid-solid interface in semiconducting GaAs devices using new methods for optically detecting nuclear magnetic resonance. Following his doctoral studies, he was a National Research Council Postdoctoral Fellow, working with Doran Smith at the U.S. Army Research Laboratory to develop techniques for micron-scale imaging of materials by force-detected magnetic resonance. Marohn was recently honored with an invited talk at the Centennial Meeting of the American Physical Society.

He joined the Chemistry and Chemical Biology faculty in July 1999. His research interests tend toward analytical chemistry and materials science: he is pursuing studies of conducting polymer films by several scanned-probe microscope techniques and continues to develop magnetic resonance force microscopy as a tool for understanding surface chemistry. His interests include novel electronic and magnetic materials, especially those based on organic compounds, with an eye toward developing the understanding required to build molecule-based electronics.

In fall 1999, Marohn taught the department's graduate course in Statistical Thermodynamics, Chemistry 678. He looks forward to teaching the course again next fall and then to taking on the grand challenge of teaching Chemistry 211, Chemistry for the Applied Sciences, in the spring. "Despite the fact that chemistry is at the heart of advances in applied fields from materials science to electrical engineering, Chemistry 211 is both the first and last college chemistry course that many of Cornell's engineers will take," he says. "I have one short semester to teach them to look at the world through a chemist's eyes."



At Cornell, Marohn is pursuing research projects at the interface of physical, analytical, and materials chemistry. "I am interested in advancing what is known about novel materials like conducting polymers, and equally interested in developing new tools for analyzing and imaging such materials," he says.

Everyday polymers (like those in your shoes and car tires) are cheap, inert, and electrically insulating. While examples of organic crystals, even polymers, that conduct electricity have been known for quite some time, it is only recently that advances in preparative techniques have allowed chemists to make conducting polymers that are both highly conductive and chemically stable, yet processable and inexpensive. Perhaps not surprisingly, a chemical understanding of organic conductor phenomena is still lacking. In making an organic conductor or semiconductor, chemical structure matters, but apparently the material must be deposited in a well-ordered thin film to function well.

Gleaning information about materials like conducting organic films is one of the goals of the Marohn group's research. A technologically relevant sample might contain only a few tens of atomic layers of polymer or organic oligomer, and understanding fundamentals such as how the molecules order and how charges get "stuck" in these materials is a distinct challenge. Something as basic as the mechanism(s) of charge conduction in most such compounds is not well understood. "Few of the chemists' workhorse analytical tools—and certainly not something as informative as, say, nuclear magnetic resonance (NMR) spectroscopy—are sensitive enough to work on films containing so little material," says Marohn. "X-ray scattering can be informative, but sometimes the films are even too disordered for that. Mass spectroscopy can tell you what molecular fragments are present in the film, but at the expense of destroying the sample!"

Materials research quite often produces too little material to be examined by our most powerful analytical tools like infrared and NMR spectroscopy. And while the scanning-tunneling microscope and the atomic force microscope, lending their ability to "see" individual atoms at a surface, have helped spawn a renaissance in surface chemistry, the "scanned probe" microscopes generally cannot see below a surface or even tell one type of atom from another. The Marohn group is pioneering two tools for peering at and below a surface, using electrical and magnetic forces.

In one such tool under development in the Marohn laboratory, the magnetic resonance force microscope, a tiny magnet is attached to the end of a silicon cantilever (diving board). The diving board might be only 50 micro meters wide, a few hundred micrometers long, and only a few micrometers thick (for reference, a single human hair is only about 50 microns in diameter). The magnetic-tipped cantilever is brought close to a surface and a deflection of the cantilever records the presence of magnetic material underneath, to which it is drawn by magnetic attraction (known to physicists everywhere as the "refrigerator-magnet force"). The "magnetic material" can be the hydrogen nuclei of an organic compound, which exhibit a weak nuclear magnetism—in fact, you can record the nuclear magnetic resonance signature of subnanograms of material by this technique. In another tool, the electric-force microscope, the silicon diving board is electrically charged by application of a voltage, and scanned over a surface to image surface charge.

Conducting polymer devices contain a relative abundance of material compared to what chemists and physicists have been recently considering: electronics at the single-molecule level. Work is under way worldwide to carry out atomic-level transformations, not with test-tube quantities of material (synthetic chemists of course rule the roost here!), but at the *single-atom* level. Generally applicable analytical tools for following chemical transformations at the single-atom level are much needed. Magnetic resonance force microscopy holds long-term promise for mapping the positions of atoms in a single-molecule (for example, a single protein) near a surface, and electric-force microscopy holds promise for detecting with sensitivity to a tiny fraction of a single electron's charge.

"I am currently setting up my laboratory," says Marohn. His first order of business is getting the state-of-the-art, home-built, scanned-probe microscopes up and running, and Marohn hopes that the first instrument may show some data by the end of the summer. He adds, "I was fortunate to have had an especially motivated and talented graduate scholarship student start working with me essentially the week I arrived at Cornell. The group has since grown to include a second super-enthusiastic chemistry graduate student and an undergraduate chemistry/computer science student, and we're looking forward with great anticipation to the scheduled arrival of a postdoctoral researcher this summer."

Lab Notes

Technology Review Selects Coates as one of 100 'Young Innovators'

David Brand, Cornell News Service

Geoffrey Coates, assistant professor of chemistry and chemical biology at Cornell, has been selected by *Technology Review* magazine as one of 100 young innovators under the age of 35 "who exemplify the spirit of innovation in science, technology, business, and the arts."

The magazine, published by the Massachusetts Institute of Technology, celebrated its one hundredth anniversary in its November/December 1999 issue with a special section on "the most remarkable group of innovators under 35 ever assembled."

This group of young people is better positioned than anyone else to see the future of technology, the magazine says. And it asked each innovator to comment on the most important technological trends of the next decade.

In the area of plastics, the magazine says, "Coates is designing improved polymers by trying to understand how a catalyst affects a polymer's architecture—and hence its properties. The goal is to be able to make the catalyst structure that leads to just the polymer properties you want."

A major theme of Coates's research efforts is the synthesis of polymers using biorenewable resources, such as carbon dioxide (CO_2) and biologically synthesized compounds. Coates, who is 33, has found a seemingly efficient way to copy photosynthesis, nature's efficient way of extracting CO_2 from the atmosphere and turning it into both monomers and polymers in the form of sugars and polysaccharides.

Coates and his colleagues at Cornell have reported on a zinc-based catalyst used to react CO_2 and epoxide molecules to produce a class of materials called polycarbonates. An epoxide is a three-ringed molecule such as ethylene oxide. These materials have an activity that is significantly higher than any previous catalyst in copolymerizations of CO_2, meaning that for the first time the process appears to be economical and to have commercial possibilities. Coates also has made recent breakthroughs concerning the synthesis of biodegradable polymers from lactic acid, a nontoxic compound that can be easily made from corn and potatoes.

Coates recently received a four-year, $328,000 Faculty Early Career Development Program grant from the National Science Foundation (NSF) for research into the development of new catalysts for synthesizing biodegradable polymers from CO_2. He expects his research to lead to a fundamental

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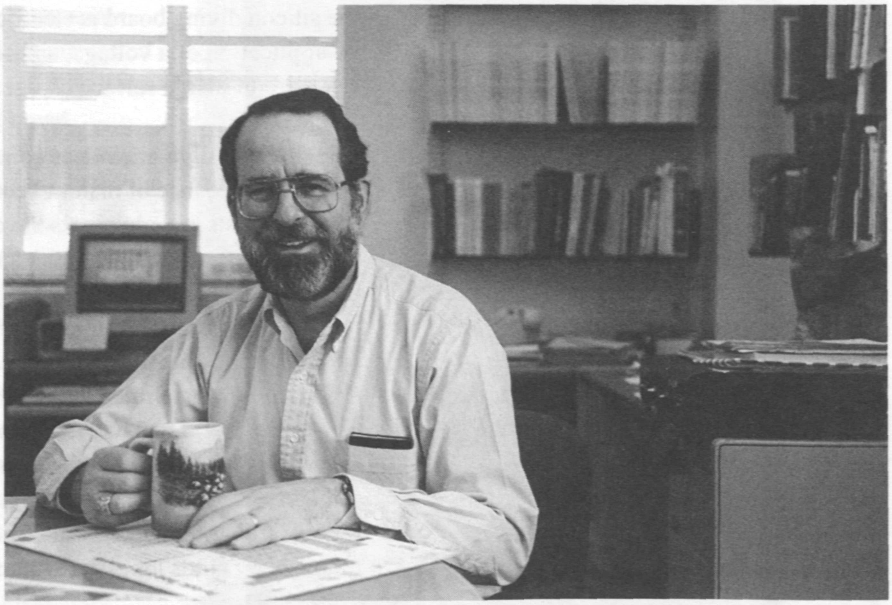
Cooling in Miniature, without Bulky Machines, Conventional Fluids, or Moving Parts, Is Goal of Materials Research at Cornell

David Brand, Cornell News Service

It's possible that one day all the cooling power of a noisy, bulky household refrigerator will be available on a small device that is lightweight and has no moving parts. And the same device, when given a heat source like a car's exhaust pipe, could be used to generate electricity.



Francis DiSalvo

Such thermoelectric devices already exist in consumer products like plug-in auto beverage coolers, where energy efficiency is less important than portability and low weight. The challenge facing researchers is to find new materials that could bring the technology to the next level in which the efficiency would rival that of conventional coolants in air conditioners as well as refrigerators. Also in the future might be miniature cooling devices directly on computer chips.

"As we increase the efficiency of thermoelectric devices, we create another tool in the arsenal for choosing the most efficient way to do things. You can think of some applications pretty quickly, and others would come up once the technology is available," says Francis DiSalvo, professor of chemistry and chemical biology, who is attempting to develop new thermoelectric materials. DiSalvo described the status of research in the field in a recent issue of *Science*.

In conventional cooling devices, heat is carried away by a working fluid, such as a chlorofluorocarbon, which involves the moving parts that cause most equipment breakdowns, environmental damage, and bulkiness. In thermoelectric devices, the "working fluid" is an electrical current that runs through a junction between differently doped semiconductors and pulls heat away from that junction, producing cooling without any moving parts.

Current thermoelectric materials operate at roughly 10 percent of Carnot efficiency, the theoretical maximum allowed by the laws of thermodynamics, compared with about 30 percent for an average household refrigerator. The theory behind thermoelectric devices has been around for more than 40 years, but current materials don't rival the efficiency of compressor-based devices. "The theory is not specific enough to say, 'If you could make this kind of material—that is, this composition with atoms in a particular crystalline arrangement—that will give you the high thermoelectric efficiency,' DiSalvo says "We have to go find the materials by an empirical process, test them one at a time and say, 'Is our understanding good enough that we can predict from what we're learning today about what's the next best thing to try to synthesize after that?'"

The search, funded by the U.S. Office of Naval Research, is complex because, according to DiSalvo, with the exception of designing organic molecules based on carbon, the ability to predict the composition and structure of materials made from three or more elements is completely lacking. "For most of the elements in the periodic table, we don't know what will happen when we put them together, he says. If we knew how to do that, then we could calculate from the structure what the thermoelectric properties might be like. And the theory is good enough now that the results would be fairly accurate."

The search is focused on uniform bulk materials, which can be prepared in large amounts by traditional synthetic methods, and on compositionally modulated films, which require expensive nanofabrication. Bulk materials, the object of DiSalvo's research, primarily have applications in large devices like home refrigeration and recovering power from car heat exhaust, while modulated film research might be applicable to niche markets like on-chip cooling.

Researchers know they need a material with low thermal conductivity and high electrical conductivity, which has led them to look at compounds of heavy elements like lead, antimony, bismuth, and tellurium. "We have some compounds that looked promising based on platinum, DiSalvo says. No way you're going to build devices like that out of platinum — way too expensive." But, he says, "if we can do the proof of principle, then we're off and running; we've got our foot in the door."

DiSalvo's article, "Thermoelectric Cooling and Power Generation," appeared in the July 30, 1999 issue of *Science*.

Research Discovery Sets Stage for Design of New Cancer-Fighting Drugs

Roger Segelken, Cornell News Service

Cornell cancer researchers have revealed the molecular structure of a protein complex believed to influence the malignant transformation of cells, setting the stage for development of unique tumor-blocking drugs.

The structure of Cdc42, a molecular "switch" that turns on essential pathways in both normal and cancerous cells, and GDI (for guanine nucleotide-dissociation inhibitor), a key regulator of the Cdc42 switch, is reported in the February issue of the journal *Cell*.

"Knowing the precise, atom-by-atom structure and shape of this molecular switch (Cdc42), and the structure of other cellular proteins that regulate its activity, should eventually allow us to identify and even design small molecules that alter Cdc42 function and thereby prevent the Ras oncogene from inducing the malignant state," explains Richard A. Cerione, professor of molecular medicine in the College of Veterinary Medicine and professor of chemical biology in the department. The Ras oncogene is a gene that can cause cancer when it is altered.

Gregory R. Hoffman, left, a graduate student in biophysics; Richard A. Cerione, center, professor of molecular medicine and chemistry and chemical biology; and Nicolas Nassar, a postdoctoral associate in molecular medicine, published their findings on the Cdc42/GDI complex as the cover story in the February issue of *Cell*. One of their diagrams of the complex's structure is shown on the computer and on the wall behind it in Nassar's office in the Veterinary Medical Center.
Frank DiMeo/University Photography

The structure of the protein complex was mapped at MacCHESS, Cornell's high-energy synchrotron source, where the scientific technique called X-ray crystallography reveals the three-dimensional arrangement of atoms in molecules by bombarding them with intense bursts of X-rays. A "ribbon" diagram of the Cdc42/GDI complex is printed on the cover of *Cell*. Co-authors of the report, along with Cerione, are Gregory R. Hoffman, a Cornell graduate student in biophysics, and Nicolas Nassar, a post doctoral associate.

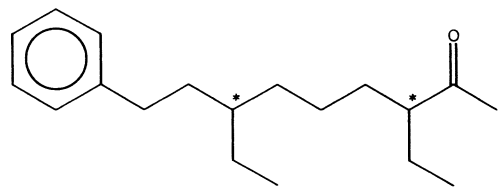
The mammalian Cdc42 protein was originally was purified and cloned at Cornell by researchers in Cerione's laboratory in 1990. Cdc42 is believed to play a dual role, alternating between being an essential protein for normal cell growth and a switch that allows protein from a mutated Ras oncogene to cause cancer. Many of the current strategies for intervening against cancer are directed at the Ras protein, which becomes oncogenic when mutated at a single amino acid residue. The Cornell biochemists believe that, given the essential function of Cdc42 in Ras-induced malignant transformation, it should be possible to block signals that lead to cancer by modulating Cdc42 activity.

"We are not ready to start designing drugs yet," Cerione cautions. "This has been an extremely difficult biological problem. Just obtaining sufficient amounts of the proteins in functional form and figuring out how to crystallize them was a formidable challenge. The achievement is a real tribute to Greg and Nico's talents and dedication," he says of his scientific colleagues.

Cornell University, however, is one of the few institutions in the world with the scientific capability to move a discovery from the basic-biology stage to the determination of molecular structure, the design of drugs and finally to clinical trials, observes Douglas D. McGregor, associate dean for research in the College of Veterinary Medicine. He points to Cornell's expertise in chemical biology in the College of Arts and Sciences, the university wide Genomics Initiative and MacCHESS, as well as to the veterinary college with its Molecular Medicine and Comparative Cancer programs, the hospital clinics where animal patients with cancers are treated, and the facilities for conducting clinical trials of new therapies in animal models.

Studies of the Cdc42/GDI complex were supported by grants from the National Institutes of Health and the international Human Frontiers of Science Program.

Scent of a Crocodile



dianeackernone

A crocodile's skin glands are thought to secrete pheromones that play a role in nesting or mating. To identify chemicals that might influence these behaviors, chemistry professor Jerrold Meinwald, biology professor Thomas Eisner, and coworkers at Cornell University analyzed secretions from the skin glands of a crocodile. The secretions were collected at several zoos around the country by Dr. Paul Weldon of the Smithsonian Institution, an authority on crocodiles and alligators. The team isolated the volatile nonanone shown here and 10 steroidal esters that appear to be its biosynthetic precursors (*Proc. Natl. Acad. Sci. USA*, **96,** 12246 and 12251 [1999]). "Crocodiles and alligators are the only remaining close relatives of dinosaurs, and there's not a lot known about the chemistry of how they communicate," Meinwald says. The nonanone—named dianeackernone after author Diane Ackerman to honor her writings in natural history—occurs as two stereoisomers. Immature crocodiles do not secrete dianeackernone, suggesting that it's produced as they develop communicative mechanisms, Eisner says. The team has synthesized dianeackernone and the major accompanying steroidal compounds to make them available to others interested in studying their effect on crocodile behavior. Behavioral studies will be a real challenge in this case, since the species studied, the dwarf African crocodile (*Osteolaemus titraspis*), lives in Central Africa.

Cornell Researchers Use Physical Laws to Simulate Protein Folding

Bill Steele, Cornell News Service

Researchers at Cornell University have had their best success yet in simulating the folding of a protein solely from the physical laws that govern the behavior of its atoms.

A group led by Harold Scheraga, the Todd Professor of Chemistry emeritus, simulated the folding of the protein HDEA from the bacterium *E. coli* on Cornell's IBM supercomputer and predicted a structure consisting of a bundle of five spiral coils that matched 80 percent of the structure found by X-ray crystallography. It was the best match of several computer-generated structures for the protein submitted to the Third Community Wide Experiment on the Critical Assessment of Techniques for Protein Structure Prediction (CASP-3), which took place over the second half of 1998.

CASP-3 is a cooperative experiment to test the accuracy of computer simulations of protein folding. Researchers are given the amino-acid sequence of several proteins for which the shape has already been determined by X-ray crystallography or nuclear magnetic resonance techniques and asked to submit their computer solution for the structure.

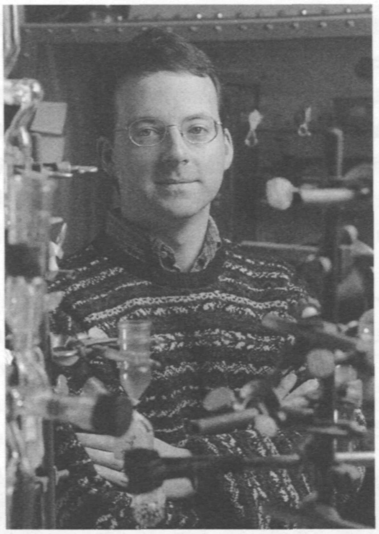
Scheraga's group submitted seven structures out of the CASP list of 43 and had solid successes with two of those. In addition to HDEA, they scored high with another protein, called MarA. The Scheraga group produced the best match to the actual structure of any simulation based solely on physical laws, although other groups found more accurate matches by using programs that compared the simulated structure with the structures of similar, already-known proteins.

***Coates** (continued from page 3)*

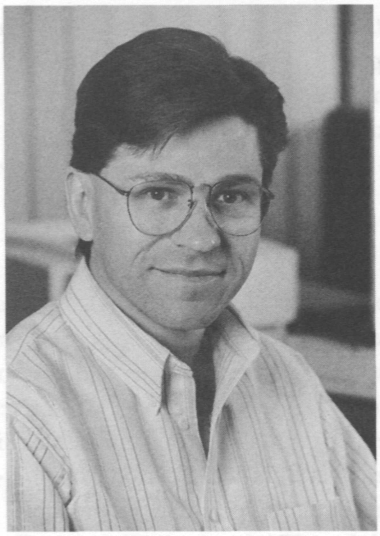
understanding of the mechanism of polymerization, as well as a feasible route to new polymer architectures that have potential commercial applications.

As part of his proposal, Coates has developed an integrated teaching and research plan in polymer chemistry, as well as educational outreach projects involving K–12 students and industrial scientists through the NSF-supported Cornell Center for Materials Research.

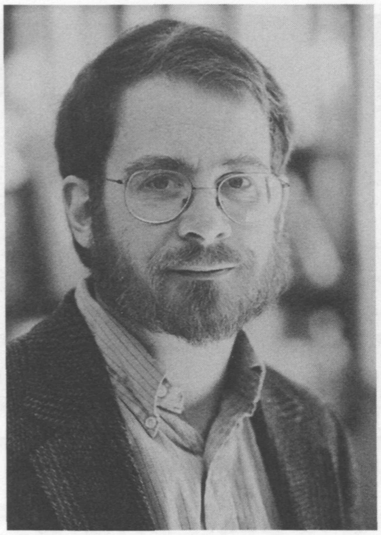
Coates earned a doctoral degree in organic chemistry from Stanford University in 1994. He joined the Cornell faculty in 1997, after postdoctoral studies at the California Institute of Technology.



Geoff Coates



H. Floyd Davis



Roger Loring

Geoffrey Coates has been named a recipient of the Beckman Young Investigator award. The Arnold and Mabel Beckman Foundation makes grants to non-profit research institutions to promote research in chemistry and the life sciences and particularly to foster the invention of methods, instruments and materials that will open up new avenues of research in science. The Beckman Young Investigators Program is intended to provide research support to the most promising young faculty members in the early stages of their academic careers.

Coates has also won the Arthur K. Doolittle Award of the American Chemical Society Division of Polymeric Materials Science and Engineering. The award, established by the Union Carbide Corporation, is given to the authors of an outstanding paper presented before the division at each national meeting of the ACS. A $750 prize is financed with the gift of royalties from Doolittle's book, *Technology of Solvents and Plasticizers.*

H. Floyd Davis has received an Alfred P. Sloan Foundation Research Fellowship. The Sloan Research Fellowships were established in 1955 to provide support and recognition to promising young scientists, often in their first appointments to university faculties.

Roald Hoffmann received the German Chemical Society's (Gesellschaft Deutscher Chemiker) highest honor—honorary membership. The award was conferred at the Thirty-Seventh International Union of Pure and Applied Chemistry Congress, which coincided with the fiftieth anniversary of the refounding of the society.

Hoffmann has written a play with Carl Djerassi titled "Oxygen." The play is based on a Nobel Prize committee as it struggles to award a retroactive prize combining the passionate pursuit of scientific knowledge with the equally passionate competition to be first. The Eureka Theatre Company will present the play in San Francisco, CA May 3–14. Information can be found at eurekatheatre.org or by calling 415-788-7469.

Congratulations to **Roger Loring** who has been promoted to full professor of chemistry and chemical biology.

Fred W. McLafferty has been awarded the J. Heyrovsky Honorary Medal for Merit in the Chemical Sciences by the Academy of Sciences of the Czech Republic. The medal, which commemorates Czech scientist Jaroslav Heyrovsky, the 1959 Nobel chemistry laureate, is the most prestigious Czech scientific award and is given for outstanding achievement.

The 2000 Jill and Ken Iscol Distinguished Environmental Lectureship has honored **Jerrold Meinwald** and Tom Eisner. The lectureship, sponsored by the Center for the Environment, was inaugurated last year by F. Sherwood Rowland. The program took place April 13 and 14 and featured lectures by both Meinwald and Eisner, internationally recognized as pioneers in the field of chemical ecology. The talks reviewed how their collaborative studies of insects and plants have provided new insights into the "chemical ways of nature." Together, their research into the chemical interactions of organisms has greatly advanced the search for new medicinals, agrochemicals and other useful substances from nature that hold immense importance to humankind. Plenary lectures were given by May R. Berenbaum, professor of entomology, University of Illinois at Urbana-Champaign, and Ian T. Baldwin, director, Max Planck Institute for Chemical Ecology, Jena, Germany.

Dotsevi Sogah has been selected to receive the Frank Giblin Award of the Society of Plastics Engineers Polymer Analysis Division. The award, given to the authors of the best paper presented, will be formally presented at the May 2000 meeting of the Society of Plastics Engineers in Orlando, Fl.

(l-r) Carl Lineberger, John Marohn, and Floyd Davis at the Fall 1999 Baker Reception

Fall 1999 Baker Lectures

W. Carl Lineberger, the E. U. Condon Distinguished Professor of Chemistry and Biochemistry at the University of Colorado, Boulder, delivered the Fall 1999 series entitled "Gas Phase Chemistry of Radicals, Anions and Molecular Clusters."

Professor Lineberger presented the series of beautifully clear lectures that spanned the realm from the chemical physics associated with the ionization of monatomic anions to the properties of large organic reactive intermediates. These studies had in common the use of negative ion photoelectron spectroscopy as the principal investigative tool. Professor Lineberger's presentation style was relaxed and self effacing, but it was clear to all in the audience that he was describing a series of experiments that were of world-class quality and of profound importance in their implications for a wide variety of chemical phenomena. Perhaps most remarkable in the impressive list of his accomplishments was his ability to dissect, molecule by molecule, the structure and energetics of the solvation shell for an ion-neutral cluster. Work of this kind promises finally to bridge the chasm between gas-phase and solution phase chemistry of ions.

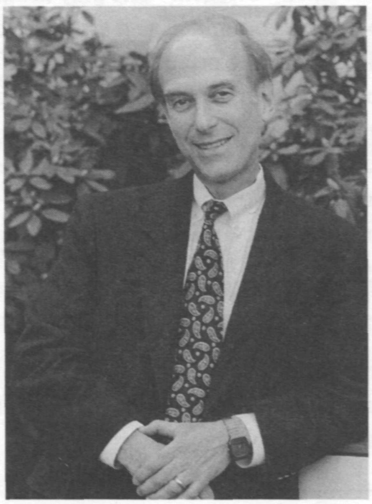
As is commonly the case with our Baker Lecturers, we found by the end of his stay that we had made a new friend in Professor Lineberger. We were very sorry to see him depart, but we look forward to his next visit in anticipation of the tales of new discovery and accomplishment that he will undoubtedly be able to recount.

—*Barry Carpenter*

Fall 2000 Baker Lectures

The lecturer for the fall 2000 Baker Lectures will be Stephen J. Lippard, the Arthur Amos Noyes Professor of Chemistry and head of the Chemistry Department at the Massachusetts Institute of Technology. He will deliver his lectures over a six-week period from mid-September through October on the topic "Principles of Bioinorganic Chemistry."

Lippard studied at Haverford College (BA, magna cum laude, 1962) and the Massachusetts Institute of Technology (PhD, 1965). After a postdoctoral year at MIT during 1965–66, he joined the faculty of Columbia University as an assistant professor of chemistry, being promoted to associate professor with tenure in 1969 and to professor in 1972. He moved to MIT in January 1983.



Stephen Lippard

Professor Lippard's research activities span the fields of inorganic and biological chemistry. Included are mechanistic studies of platinum anticancer drugs, the synthesis of dimetallic complexes as models for nonheme iron enzymes and metallohydrolases, structural and mechanistic investigations of methane monooxygenase, novel sensors for neurotransmitters, and the development of reagents for stereoselective syntheses using transition metal complexes.

Spring 2000 Frank and Robert Laughlin Visiting Professor of Physical Chemistry Lectures

Reinhard Strey with Ben Widom

Robert G. Laughlin, PhD '55, has endowed the Frank and Robert Laughlin Chair of Physical Chemistry to rejuvenate experimental phase science and to continue the pioneering spirit that has been a tradition at Cornell for 100 years. Until a suitable candidate is found, Laughlin has graciously agreed to allow some of the funds to be used to support a visiting professorship in this field. This year's lectures, by Professor **Reinhard Strey,** inaugurated the visiting professorship with four lectures given in February titled "Binary Water-Surfactant Systems," "Dynamics of 'Sponge' Phases," "Ternary Water-Oil-Surfactant Systems: Microemulsions," and "Block Copolymers as Giant Soaps."

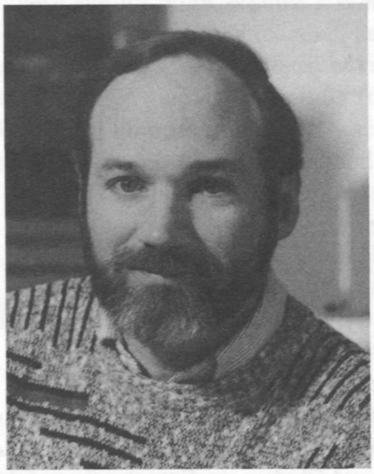
Strey, professor and managing director of the Institute for Physical Chemistry at the University of Cologne, Germany, received his PhD in physical chemistry from the University of Göttingen. From 1978 to 1993, Strey was a senior scientist at the Max Planck Institute for Biophysical Chemistry in Göttingen. In 1993 he made his habilitation at the University of Göttingen and became a full professor in 1996 at the University of Cologne.

Strey's current research includes phase diagrams and structure of microemulsions, neutron scattering, electron microscopy, nucleation phenomena, and interfacial and critical phenomena. A listing of his more than 150 publications can be found at www.uni-koeln.de/math-nat-fak/phchem/strey/rspubl.html.

In 1995 Strey received the Nernst-Haber-Bodenstein Prize of the German Physico-Chemical Society (Deutsche Bunsengesellschaft), and in 1998 he was awarded the Carl Wagner Prize of the Max Planck Institute for Biophysical Chemistry.

Spring 2000 Blomquist Lectures

The Alfred T. Blomquist Lecture series is named after Blomquist, who arrived at Cornell in 1932 as a National Research Council postdoctoral fellow and subsequently served as a professor of organic chemistry. Blomquist established an international profile for his work in the behavior of small-ring molecules, the chemistry of many-membered rings, and the synthesis of novel monomers and polymers. The series, funded by Professor Blomquist's family, former students, and coworkers, brings to the department **Dennis Dougherty** from the California Institute of Technology. Dougherty will give his lectures on May 9 and 10, titled "Physical Organic Chemistry on the Brain I. A Cation-π Interaction at the Nicotine Receptor," "Physical Organic Chemistry on the Brain II. Chemical Probes of Neuroreceptor Function," respectively.



Dennis A. Dougherty

Dougherty received his BS and MS (1974) in chemistry under the advisement of M. B. Winstead at Bucknell University and a PhD in 1978 under K. Mislow at Princeton University. After a short postdoctoral fellowship with J. A. Berson at Yale University, in 1979 Dougherty joined the faculty at the California Institute of Technology and was promoted to full professor in 1989.

Spring 2000 Aggarwal Lectures

This series of lectures, inaugurated in 1995, is funded by the late Sundar L. Aggarwal, PhD '49. Aggarwal, who retired as vice president and director of GenCorp research division in 1988, was an industry consultant who received industry awards and published articles on and received patents for synthetic rubbers, block polymers, and composites. He was a fellow of the Institute of Materials Science and a member of the American Chemical Society, the Directors of Industrial Research, and the Industrial Research Institute.

Professor Robert Waymouth from Stanford University will deliver the Spring 2000 Aggarwal Lecture Series. Waymouth's research centers on synthetic and mechanistic organometallic chemistry and catalysis. Lectures are scheduled for May 22, 23, and 24, titled "Designer Polyolefins: Stereospecific Olefin Polymerization with Well-Defined Catalysts," "Elastomeric Polypropylene: Structure and Properties of Stereoblock Polypropylene," and "Control of Sequence Distribution in Olefin Copolymerization," respectively. The first two lectures will take place as part of the Cornell Center for Materials Research Polymer Outreach Program (POP) Symposium. POP is collaborative research programs between Cornell faculty groups and scientists in industry. For more information see the POP website at www.ccmr.cornell.edu/pop/.

Professor Waymouth received his BS/BA in 1982 from Washington and Lee University and his PhD in 1987 from the California Institute of Technology. In 1988 he was a postdoctoral fellow at ETH in Zurich, afterwhich he joined the faculty at Stanford University where he was an NSF Young Investigator, and an A.P. Sloan Fellow. He won the Union Carbide Innovation Award, Phi Beta Kappa Undergraduate Teaching Award, Bing Teaching Award, Arthur C. Cope Scholar Award, Fresenius Award, NSF Alan T. Waterman Award, and the Walter J. Gores Teaching Award. In 1997 he was named to the Wilhelm Manchot Professorship.

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 2000 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.

James Gibson, PhD '57, has recently retired from the faculty of Colorado State University after 36 years. Congratulations—and enjoy!

Stephen E. Schullery, PhD '70, writes: "I have recently retired after teaching for 28 years in the Chemistry Department of Eastern Michigan University. I was the first Cornell graduate student to sign on with Gordon Hammes after his move from MIT (and often suspected I must have made him wonder whether he had done the right thing). For most of my career at EMU I extended my thesis research into kinetic and thermodynamic studies of liposome model membranes. Several years ago I was seduced by PC-based molecular modeling and left the lab to undertake diverse collaborations helping my department colleagues explain their data. This has been a lot of fun and gratifyingly productive and, so far, I have been able to continue it into my retirement. It is nice, after all these years passing as a physical chemist, to finally actually be able to do (or at least outwardly appear to be doing) quantum calculations! My rather early retirement was precipitated by my wife Nancy's (SUNY-Cortland, 1968) recent completion of her PhD in communication and our discovery that she now enjoyed college teaching much more than I. So I agreed to "follow her" this time. Along the way, I discovered PC-based statistical analysis and am having fun learning about that mysterious world while serving as my wife's research assistant in such matters. We even have a coauthored paper under review! Having been raised to believe that if you needed statistics to analyze your data you should be ashamed for having designed such a poor experiment, considerable attitude adjustment was required on my part, and I now even agree that social science is. I would like to repeat some advice I first overheard Gordon Hammes offering soon-to-depart Paul Schimmel many years ago: "Never be afraid to try something new."

Ronald D. Icenogle, PhD '81, has been included in the 2000 edition of Marquis *Who's Who in the World,* and is being considered for the 2001 edition of Marquis *Who's Who in America.* After leaving Cornell in 1980, Ron spent about a decade working as an industrial chemist in the plastics industry. His most notable industrial work was done while working for Shell Development Company in Houston, Texas. Since leaving industrial chemistry, Ron has lived in Washington state and has worked as a writer, high school science teacher, and, most recently, as a computer analyst/programmer for the state of Washington. In 1996 he published *Science and Moral Choice: An Examination of the Foundations of Moral Philosophy,* Warren H. Green, Inc. He is married and has two boys, ages four and seven.

Linda H. Doerrer, AB '91, is now an assistant professor of inorganic chemistry at Barnard College in New York City. Linda wrote us a quick note to let us know she enjoys the newsletter.

Rachel Winston, AB '95, writes that she has received her PhD from Scripps Research Institute and is now a postdoctoral associate at the University of California, Berkeley. She plans to marry Dustin McMinn in August.

Michael Hwang, AB '97, has accepted a high school teaching position. He will teach biology at St. Paul's High School in Bristol, Connecticut.

Peter Willis, MS '96, PhD '99, writes that he has settled in to his new life in Texas. He is a NASA postdoctoral research associate in the Center for Nanoscale Science and Technology at Rice University in Houston, Texas, with advisor Richard Smalley. "I hope that everything is going well in Ithaca."

Shu Yang, PhD '99 has been named winner of the 1999 ICI Student Award in Applied Polymer Science. The award, sponsored by ICI and administered through the Joint Polymer Education Committee of the ACS Divisions of Polymeric Materials: Science and Engineering (PMSE) and of Polymer Chemistry, is given annually for the best paper ("Improving Resist Performance with Block-Copolymer Additives") presented at the ICI Award Symposium as part of the PMSE program during the Fall 1999 ACS national meeting. Yang is now employed as a member of the technical staff at Lucent Technologies' Bell Labs, in polymer and organic materials research. Currently, she is working on ultralow dielectric constant materials and resist materials for photolithography.

In Memoriam

Halsey W. Buell, Jr. writes, "I regret to inform you that my father, **Halsey W. Buell,** MS '37, died on May 25, 1998, in Fort Lauderdale, Florida. In 1978, he retired from Carborundum Co. in Niagara Falls after 37 years of service. He was an international abrasives and resin consultant for 20 years. After retirement, he continued international consulting into his eighties. He was probably better known internationally in his field than he was in the United States."

Terry Donohue, PhD '74

Everett C. Hughes, PhD '30, June 18, 1999.

Bienvenido T. Miranda, MS '61, August 2, 1998.

C. Frederick Tears, Jr., BChem '40, 1998.

2000 Reunion Open House

Friday, June 9
1:30 - 4:00 pm
125A Baker Laboratory

Refreshments, memorabilia, and informal chats with faculty and staff

It has been many years since the department has sent out a survey for alumni and friends. Unfortunately, necessity brings about this one. In January of this year, the department had a breakdown of a computer server which housed our alumni and friends databases. We have been unable to recover extensive updating of the files which took place over the last 5 or so years.

We would greatly appreciate your taking the time to fill out the survey and returning it to us in the postage paid envelope provided with this newsletter. Thank you.

Full Name: ______________________________

Preferred Salutation: ❑ Dr. ❑ Professor ❑ Ms. ❑ Mrs. ❑ Miss ❑ Mr. ❑ none

Home Address Information:

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State: ______________ Zip: ______________ Country: ______________

Phone: ______________ Fax: ______________

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Position ______________________________

Department ______________________________

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City: ______________________________

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Phone: ______________ Fax: ______________

E-mail: ______________________________

Preferred mailing address: ❑ Home ❑ Business

Alumni Information

Degree: ❑ BChem ❑ BA ❑ AB ❑ MS ❑ PhD ❑ Other: ______________

Degree Year: ______________

Advisor: ______________________________

Continued on the next page

Survey

Friend Information

Position: ❑ Faculty ❑ Visiting Scientist ❑ Postdoc ❑ Staff (position _______________) ❑ Recruiter
❑ Other: ____

During what years: ______________________________

Principal investigator or supervisor: ______________________________

Would you like to be included on a Cornell Chemistry Alumni and Friends e-mail notification list? This list would be moderated and set up for periodic notices of ACS Breakfasts, Reunion open house schedules, notices of on-line newsletters, and other events taking place in the department.
❑ No ❑ Yes (Please use my
❑ Home e-mail ❑ Business e-mail address)

Occasionally fellow classmates or alums ask us for contact information, would you like us to release your information? ❑ Yes ❑ No
❑ Send the request on to me.

The department plans to have the newsletter available on-line in PDF format. When that happens, would you rather view the on-line publication, or have a printed version mailed to you? ❑ On-line ❑ Printed

We are also interested in what you did before or after Chemistry, i.e., if you received degrees from other departments or institutions,(degree, year, institution), industry positions, etc.

News for the next edition of *Chemistry and Chemical Biology*

please use more paper as needed

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