Chemistry and Chemical Biology

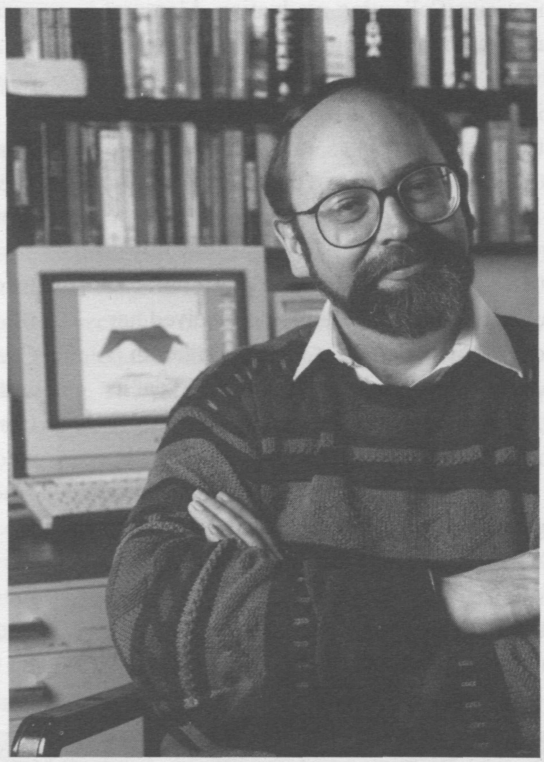
June 2002 Number 75 www.chem.cornell.edu

The Chair's Notebook

Reality Check

In my first contribution to this newsletter I suggested that there were (at least) three reasons to be very optimistic about the future at Cornell's Department of Chemistry and Chemical Biology. The reader may reasonably have suspected that this was the kind of overly cheery representation of reality that one often finds in mailings to alumni or in those letters from friends and relatives that fall out of greeting cards during the holiday season. In this second essay I have the opportunity to report on some independent assessments of the same issues, which all happened to occur during the past few months. To remind you, the factors that I highlighted were: the match of the culture in the department to the demands of our changing science; the extraordinary promise of the young faculty members who, by definition, represent the department's future; and the expectation that we may have a new building to house the burgeoning research and teaching enterprise that I was describing. Let me now summarize the recent events that have had bearing on these topics.

In February we hosted an external committee that came at the behest of the college and university administrations to conduct a review of the academic aspects of our department. By any measure this was a blue-ribbon panel. The members were Paul Barbara (chair) from the University of Texas at Austin, John Bercaw from Caltech, Laura Kiessling from the University of Madison, Wisconsin, and Mark Ratner from Northwestern University. During the three days that they spent on campus the team spoke with Dean Lewis and his colleagues in the College of Arts and Sciences, with the faculty in the department, and with the teaching staff, postdoctoral associates, graduate students, and undergraduates. They also toured research and teaching facilities. The dedication that committee members showed in carrying out their charge was truly remarkable. While the details of their final report are confidential, I will reveal that one of their conclusions was that the culture of cooperation and collegiality in our department is without equal in any of the top-ranked chemistry departments in the nation. The committee recognized, as we do, that this cohesion gives us great advantages in tackling problems, whether they be of the kind that we like—the scientific ones—or the other sort. We are very grateful to the committee members for their hard work and for the clear and forceful expression of their findings and recommendations.



Jon Reis Photography

Barry Carpenter

The second component of my optimistic view—the quality of the recently hired faculty—has also received independent validation, this time in the form of awards and research support. You will find the details on pages 8 and 9. I am constantly amazed at the scope

continued on back page

All are invited to the continental breakfast at the 224th National ACS Meeting in Boston 7:45 am, August 20, Sheraton Hotel — Kent Room

2001 and 2002 Summer Sokol Fellowships

The department was very pleased by the visit, last summer, of Margaret Sokol, endower of the Margaret and Herman Sokol Fellowhip in Chemistry and Chemical Biology. The fellowship was established in 1995 by Mrs. Sokol in her and her late husband's name, to support graduate students in chemistry.

Margaret and Herman Sokol earned undergraduate degrees from Montclair State University. Following graduation, Margaret taught mathematics and science in the public schools. Herman, former president of Bristol-Myers, was a research scientist and, with several associates, discovered the antibiotic tetracycline in the early 1950s.

Mrs. Sokol visited the department in July 2001 to meet the summer 2001 fellow, Katherine Maloney. Katherine received her undergraduate degree at Pacific Lutheran University and is now in her second year as a graduate student in Professor Jon Clardy's group. Her research in chemical biology is on how a specific fungus from a Costa Rican tree makes a variety of diterpenes. The fungus was first investigated as part of an effort to discover new pharmaceutical agents in tropical rain forests, and the fungus, which became known as CR115, makes a potent antibiotic with good activity against methicillin-resistant Staph and vancomycin-resistant Enterococcus. As CR115 was investigated further, it was discovered that it makes not just one antibiotic but a family of related compounds. Katherine is investigating how and why CR115 does this. The larger questions involve how organisms defend themselves chemically, how nature encodes the instructions for making a variety of compounds, how nature regulates the production of just one compound, and possibly how to discover new pharmaceutical agents.

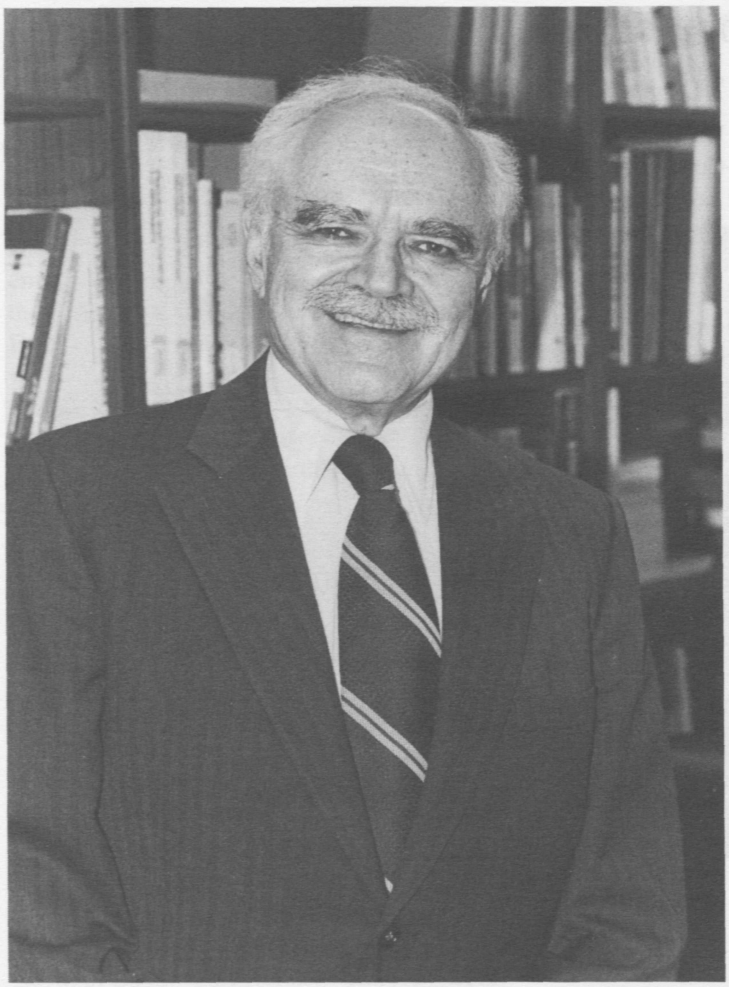
The summer fellows for 2002 have recently been announced: Ethan Settembre and Steve Broadwater.

Ethan's keen interest in science and art flourished during his undergraduate years at Cornell, while working in a variety of labs and becoming an active member of the Cornell University Glee Club. Ethan graduated from Cornell in 1998 and is now a graduate student in Professor Steven Ealick's lab. His primary research interest involves the relationship between the structure and function of proteins. Specifically, he is studying the proteins involved in the Vitamin B1 biosynthesis pathway and the polyamine pathway (a source for plausible chemotherapeutics), using X-ray crystallography. This technique allows a three-dimensional snapshot to be taken of the arrangement of atoms in a protein.

Steve studied chemistry while attending Western Maryland College, winning awards for excellence in chemistry from the college and the ACS in both his junior and senior years as well as a writing award for his senior thesis.

During his first year at Cornell, Steve has joined the research group of Professor Tyler McQuade and is currently synthesizing a series of liquid crystalline mesogens based on oligo(phenylene ethynylene) cores using cross-coupling methods. These materials are of particular interest because their photophysical properties can be tuned through defined structural changes within the molecules. Energy transfer events occurring within materials in the crystalline, liquid crystalline, isotropic, and solution phases are being explored.

Photos by University Photography



Moses Passer Lecture Series Established

In honor of the late Moses Passer, Ph.D. '48 and former American Chemical Society director of education, his widow, Dorothy Passer, has endowed the Moses Passer Lecture Series in the Department of Chemistry and Chemical Biology. The first lecture will be presented in the fall of 2002.

Born in Poland on January 30, 1917, Moses Passer was brought to the United States by his parents as a child and grew up in Rochester, New York. He attended the University of Rochester, from which he graduated in 1945 with a B.S. in chemistry, and Cornell University, which in 1948 granted him a Ph.D. in organic chemistry (under the guidance of A. T. Blomquist, working on organic reaction mechanisms). From 1952 to 1953, he conducted postdoctoral research at the University of Illinois (with C.S. Marvel in polymer chemistry).

Moses Passer had two professional careers. The first career, 1948–64, was at the University of Minnesota, Duluth (UMD), as assistant professor, associate professor (1954), and professor of chemistry (1960). During his last 10 years at UMD, he also directed the Duluth section of the Minnesota Peat Research Project. In 1964, Passer accepted an appointment as educational secretary of the American Chemical Society and, the following year, initiated the ACS Short Courses program at the 1965 spring national meeting. The short courses captured the imagination of the ACS community and were an instant success.

When Passer joined the ACS staff in 1964, educational activities consisted of career services, student affiliates, and the Committee on Professional Training. By 1987, ACS educational activities encompassed a broad spectrum of novel and effective programs designed to make chemistry accessible to every audience. These ranged from pre–high school science projects for parents and children, through a rich variety of activities at the high school, college, and university levels, to a wide array of in-person and media lifelong continuing education offerings for practicing professionals in the chemical sciences. Indeed, the continuing education programs became models for scientific societies both in this country and abroad. The rapid growth of the ACS education sector during Passer's tenure is illustrated by the fact that more than 90 percent of the educational activities available at his retirement were developed under his leadership, and the education budget grew five times as fast as the ACS overall. Interestingly, none of this growth constituted a drain on ACS resources—much of it derived from programs such as continuing education, which were financially self-sustaining, or from programs supported by grants and contributions from non-ACS sources such as foundations.

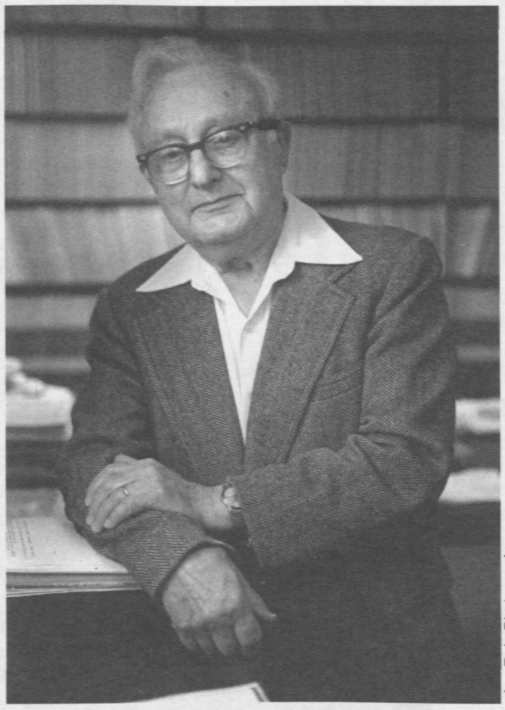
In 1993, at a national meeting of the American Chemical Society, Moses Passer was honored with a symposium in his name, co-sponsored by the ACS Division of Chemical Education and the Society Committee on Education. This symposium was in recognition of Passer's contributions to science and chemical education during the more than two decades he served on the ACS staff.

Also in 1993, the ACS Division of Chemical Education announced the Passer Education Fund. This fund was established by Moses and Dorothy Passer to help improve the teaching of the chemical sciences by providing grants to chemistry and chemical technology teachers at undergraduate institutions. The grants support participation in continuing education courses in subject matter directly related to teaching.

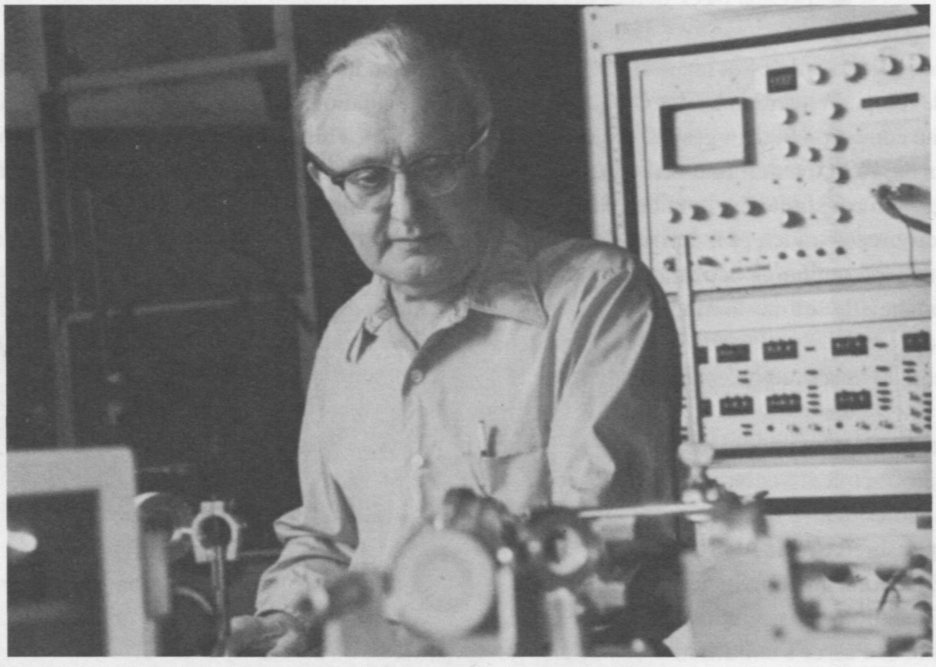
Moses Passer received the District of Columbia Institute of Chemists Honors Scroll in 1977, and was a member of Sigma Xi, the American Association for the Advancement of Science, and the Cosmos Club. He died at his home in Washington, D.C., on January 10, 1999.

Ninetieth Birthday of Simon Bauer Celebrated

October 12, 2001, marked the 90th birthday of Professor Emeritus Simon Bauer. The department celebrated this occasion with a symposium in his honor on Saturday, October 6. Alumni, faculty, family, and close friends were invited to take part. On Friday evening, October 5, a welcome reception was held in the lobby of Baker Lab giving old acquaintances a chance to catch up. The symposium officially began on Saturday morning with presentations from Kenneth Hedberg, Oregon State University: "Molecular Structure Measurements by Gas-Phase Electron Diffraction: A Historical Perspective"; M.C. Lin, Emory University: "First-Principles Prediction of Rate Constants and Product Branching Ratios for Complex Chemical Reactions"; and Raphael D. Levine, Hebrew University: "Driving High-Barrier Four-Center Chemical Reactions: What I Learned from Si Bauer and Roald Hoffmann and What I Still Need to Learn from Barry Carpenter." The morning session was chaired by Wing Tsang, National Institute for Science and Technology. After a lunch break, Joseph Chiang, State University of New York at Oneonta, and chair of the afternoon session, brought participants back to presentations by Jürgen Troe, University of Göttingen: "Towards a Quantitative Understanding of Key Reactions in Combustion and Atmospheric Chemistry"; Benjamin Widom, Cornell University: "A Molecular-Motor Model"; and Simon Bauer: "Of Times Past and Times Present." The symposium closed with a social hour and dinner on Saturday evening.



Jon Reis Photography



Simon Bauer was born in Kaunas, Lithuania on October 12, 1911. His family emigrated to the United States in 1921 and settled in Chicago. He received his B.S. and Ph.D. degrees from the University of Chicago and spent two years as a postdoctoral fellow at the California Institute of Technology working with Professors R.M. Badger and L. Pauling. After serving two years as an instructor in fuel technology at the Pennsylvania State University, he was invited to join the faculty at Cornell University in 1939 and was promoted to full professor in 1950. In 1977, Bauer "retired" and was appointed professor emeritus. Since then he has continued to work at a pace that leaves others breathless.

October 25 Symposium Celebrates 80th Birthday of Harold Scheraga, Chemist with World Reputation for Research into Protein Structure

David Brand, Cornell News Service

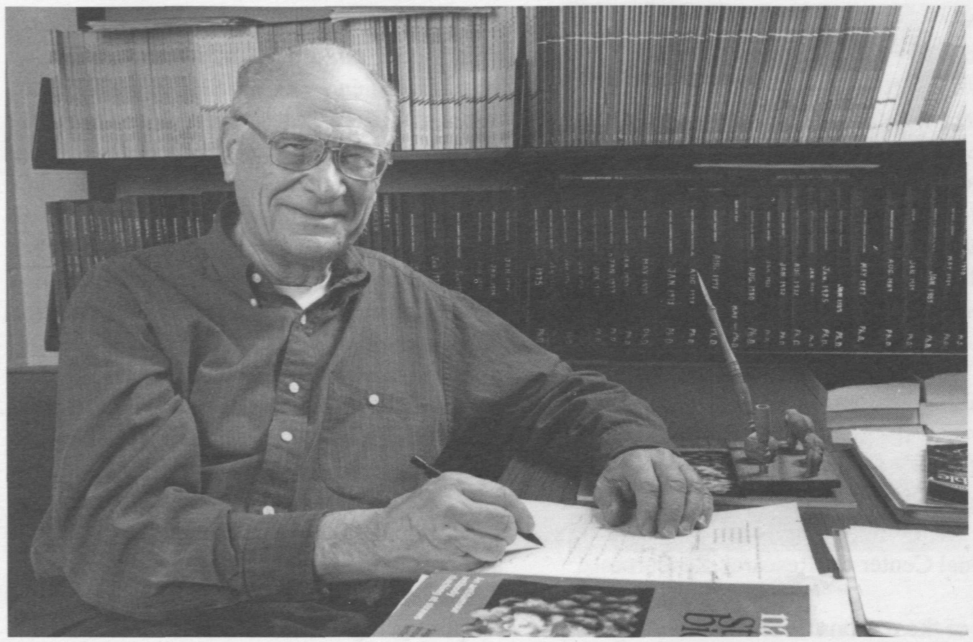
Harold A. Scheraga, one of the world's most eminent and widely published chemists and the George W. and Grace L. Todd Professor Emeritus of Chemistry and Chemical Biology, was honored by biomolecular researchers from around the world at a symposium on campus, October 25 to October 27, 2001, on the occasion of his 80th birthday.

The symposium, "The Role of Protein Structure Prediction in the Post-Genomic Era," was held in G10 Biotechnology Building, October 25 and 26, and in Baker Lab, October 27, beginning at 8:45 a.m. on all three days. It was free and open to the public.

Scheraga has won numerous awards for his groundbreaking research into protein structure. "I remember most of Harold Scheraga's papers that appeared in the Proceedings of the National Academy of Sciences in 1967, my first year as a scientist," says Michael Levitt of Stanford University. "Harold's work stood out both for its bold approach and also for the high degree of technical innovation. He inspired me with the confidence to tackle the protein folding problem head-on."

Levitt presented a talk "Protein Folding: A Paradigm for Solving Hard Problems in Biology," during the symposium's Saturday session.

Other participants covered a wide range of topics, from recent technical advances in nuclear magnetic resonance experiments for use in structural biology and structural genomics to details of a novel approach to computing atomically detailed molecular dynamics. Speakers included Charles L. Brooks, H. Jane Dyson, and Peter E. Wright of Scripps Research Institute; Richard Friesner and Barry Honig of Columbia University; William J. Jorgensen of Yale University; B. Montgomery Pettitt of the University of Houston; Jay W. Ponder of Washington University; and Devarajan Thirumalai of the University of Maryland. Scheraga is widely admired for seeking out the most elegant solutions to complex problems, particularly in his quest to simulate the folding of a protein solely from the physical laws that govern the behavior of its atoms. Recognition over the past half century has included the American Chemical Society Eli Lilly Award and the Kendall, Mobil, Repligen, IBM, and Hirschmann awards. Scheraga also has received the Nichols, Pauling and Linderstrøm-Lang medals as well as the Stein and Moore Award of the Protein Society. Scheraga is a member of the National Academy of Sciences and a fellow of the American Academy of Arts and Sciences, the John Simon Guggenheim Memorial Foundation, and the National Institutes of Health. He also has been named a Fulbright Research Scholar and a Fogarty Scholar.



Jon Reis Photography

Harold Scheraga

The symposium was organized by the Cornell Theory Center, with support from Alexion Pharmaceuticals, Aventis Pharmaceuticals, Bristol-Myers Squibb Pharmaceutical Research Institute, GeneFormatics, Johnson and Johnson, Merck Research Laboratories, the National Center for Research Resources, Thermo Finnigan, and Universidad Nacional de San Luis, Argentina.

Cornell Researcher Receives $5.9 Million Federal Grant to Establish National Biomedical Center for Advanced ESR Technology

David Brand, Cornell News Service

The National Institutes of Health (NIH) has awarded Cornell University $5,897,513 over five years to establish the National Biomedical Center for Advanced ESR Technology (ACERT). ESR is electron spin resonance, a technology for studying the bonds and structures of chemical and biological materials, such as molecular mechanisms in membranes and proteins. Basically, the technique elucidates how molecules move, react, and interact with one another.

The principal investigator on the grant, who is director of the new national center, is Jack H. Freed, professor of chemistry and chemical biology, who has pioneered new methods of ESR. The grant is administered by the NIH's National Center for Research Resources.

"One of the reasons the NIH is funding us is because of the uniqueness of what we can do. Being unique is pretty important," says Freed.

The center's research facilities, being established in 5,600 square feet of lab space in the basement of Baker Laboratory, will be available to researchers worldwide, subject to review by the center. Because the work of ACERT will be basically in instrumentation and theory, it will have 21 collaborators from universities and medical schools in the United States, Canada, Israel, and Germany providing expertise in biochemistry and molecular biology. In addition, the center will provide services, such as measurements and technology transfer, to 12 academic groups initially.

Of the grant money, $500,000 is earmarked for equipment. Currently, Freed's research group has three state-of-the-art ESR spectrometers operating. Three others will come on line within 18 months. Most of this equipment is built at Cornell to unique specifications, according to Freed. The new center also will be used extensively for the training of graduate students and postdoctoral researchers. It will disseminate its research findings through software, online tutorials, biomedical summer schools, and atlases of spectra. Among its collaborators in this respect are Ron Elber, professor of computer science at Cornell, and David Schneider, a computational biologist with the U.S. Department of Agriculture and a visiting fellow at the Cornell Theory Center.

Freed's group has pioneered the technology that has enabled ESR to go to very high frequencies, approaching the far infrared, by using quasi-optical methods. This equipment has been used to unravel the complex dynamics of biosystems such as proteins and membranes. Freed explains that a protein is not just a single crystal or a frozen object but "is moving about and has internal motions, flexing and tumbling." In order to take what amounts to a fast-time snapshot of these dynamics, the Cornell researchers use high-frequency, high-field ESR (known as HFHF ESR), which freezes out the slow motions and is sensitive to the fast motions.

Freed's group also has studied the application of pulsed ESR (both HFHF ESR and two-dimensional Fourier transform ESR) to investigate dynamic molecular processes. "Pulsed ESR works in the time domain and looks directly at molecular dynamics processes. It provides unusually good resolution," Freed says. He adds: "We believe that a very important aspect of pulsed technology is our development of powerful methods for measuring distances in biomolecules in ways that complement conventional X-ray crystallography."

An important tool in ESR research employed by Freed is nitroxide spin labels (a spin label is a molecular subunit containing an unpaired electron—a so-called free radical—that attaches itself to a site in a macromolecule or biomolecule, producing spectra that provide information on changes in physical and chemical characteristics). Unpaired electrons are intrinsically unstable, but nitroxides can be prepared in a form that makes the free radicals highly stable, enabling the storing of samples for months, even years. "The essence of our research is this stability, combined with HFHF ESR and 2-D Fourier transform ESR," says Freed. "We are clearly world leaders in the physics end of ESR."

Jon Reis Photography

Jack Freed

As for direct applications to medical research, Freed stresses his background in fundamental research. "It is our collaborators who are doing the basic biochemistry that we hope will increase our understanding to address diseases," he says. "We are providing the new instrumental and theoretical technologies to further many of these basic biomedical research programs." Associate directors of the new center are Petr P. Borbat and Keith A. Earle, senior research associates in chemistry and chemical biology, and Jozef K. Moscicki, a visiting professor from Jagiellonian University, Krakow, Poland.

Same Flower Chemicals Tell Some Insects "Yes" While Warning Others "No"

Roger Segelken, Cornell News Service

When some insects zero in on a flower for nectar, their ultraviolet vision is guided by a bull's-eye "painted" on the plant by chemical compounds. Now, chemical ecologists at Cornell have discovered a second job for these compounds: warding off herbivores.

Even before a flower bud—such as the creeping St. John's wort—opens for business, the same chemicals, called DIPs (for dearomatized isoprenylated phloroglucinols), are both coloring the flower in patterns unrecognizable to the human eye and protecting the plant's reproductive apparatus by killing or deterring caterpillars, the scientists reported in the recent *Proceedings of the National Academy of Sciences* (Vol. 98, No. 24).

"Now that we know where to look, anti-feedant chemicals like the DIPs undoubtedly will be found in other plant species, and they offer clues to more natural insect control agents," says Thomas Eisner, Cornell's J. G. Schurman Professor of Chemical Ecology and one of six authors of the report. An anti-feedant chemical discourages herbivorous insects and can harm those that don't get the message.

One place DIPs are found is in hops, the female flowers of the commercial hop, which give beer its bitter flavor and also protect against pathogenic microorganisms, Eisner says. "If your beer is safe and enjoyable to drink, you ought to thank a flower."

Also participating in the Cornell study, which was supported by grants from the National Institutes of Health, were Jerrold Meinwald, the Goldwin Smith Professor of Chemistry; Athula Attygalle, director of the Mass Spectrometry Facility in the Department of Chemistry and Chemical Biology; Mathew Gronquist, graduate student in that department; Alexander Bezzerides, graduate student in the Department of Neurobiology and Behavior; and Maria Eisner, senior research associate in that department, who is Thomas Eisner's wife and research partner.

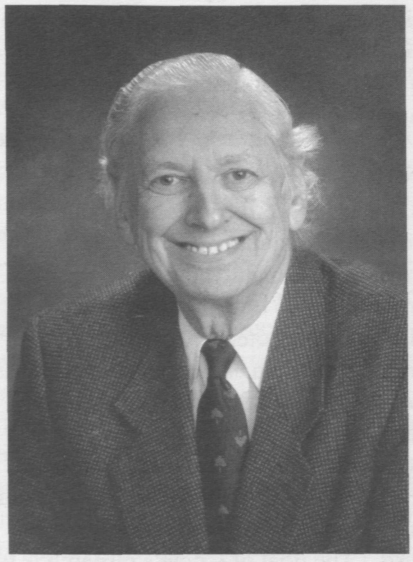
The DIP finding follows 30-year-old studies by the Eisners of floral "nectar guide" patterns that only creatures with vision in the ultraviolet part of the spectrum can see. Using combinations of special camera lenses and filters, photographic films, and video imaging, the Eisners revealed a bug's-eye world where flowers display patterns that are visible only to insects. Besides making a target on the part of the flower where nectar and pollen occur, the distinctive patterns also are believed to help insects recognize a familiar flower among a field of competing images.

"But we had a nagging suspicion that the ultraviolet-absorbing pigments had other functions for the plant," says Bezzerides, who subsequently helped to demonstrate toxicity and a deterrent effect of the chemicals. "We wondered if the chemicals originally served the plants as a sunscreen against ultraviolet radiation."

So the Cornell biologists and chemical biologists joined forces to see what would make a caterpillar sick. Adding to their suspicion that DIPs and similar compounds might have an anti-feedant function was the finding that the compounds were particularly prevalent in plant ovary walls—making up as much as one-fifth by dry weight—as well as in other reproductive structures such as the anthers. "Just as important as attracting pollinators to a plant is producing viable seed, so there is an evolutionary incentive to protect the reproductive apparatus from herbivores," says Gronquist, who characterized the chemicals.

The flowering plant chosen for the study was *Hypericum calycinum,* a native of southeastern Europe that is popular with gardeners worldwide as an ornamental. When *H. calycinum* flowers are fully open, they appear to humans as a uniform yellow disk. But to insects with ultraviolet-sensitive eyes, the disk is highlighted by a dark, ultraviolet-absorbing center, giving the flower a bull's-eye.

While Gronquist performed analyses that led to isolation of the chemical compound, the biologists devised feeding studies. They



Jerrold Meinwald

offered to larvae of the *Utheisa ornatrix* moth (also called the rattlebox moth) filter-paper discs soaked with chemicals from plants the insects normally relish.

Then the caterpillars were offered paper disks also soaked with DIP chemicals. The ultraviolet-absorbing chemicals deterred most of the caterpillars. But the DIPs were lethal to those that sampled the chemical-laced paper.

The experiments showed, according to the Cornell chemical ecologists, that DIPs both contribute to the ultraviolet pattern in flowers and serve as an anti-feedant, with potentially lethal consequences. Says Eisner, "With the same chemical, the plant is saying to pollinating insects that it needs to attract, 'this bud's for you,' and to herbivores that pose a threat, 'bug off.'"

And speaking of beer, Meinwald notes that similar chemicals from hops, which have been used in brewing for centuries, are not in the form or quantity to harm human drinkers—or even to deter fans of the bitter beverage. "What we use to flavor and to preserve beer is also used by plants both to entice the pollinators and to deter the enemy," Meinwald said. "Nature quite often has a way of using the same chemical idea to solve diverse problems."

Brian Crane Receives Major Awards from NSF and Searle

David Brand, Cornell News Service

Brian Crane, assistant professor of chemistry and chemical biology, has been named a recipient of two major research awards: the National Science Foundation (NSF) Faculty Early Career Development Program award and a Searle Scholars Program grant.

The NSF award, for $598,180 over five years, will support his exploration of the controlled movement of charge, which he describes as "ultimately, the essence of life." Nature's ability to tune the reactivity of metal centers in proteins and to direct electron flow within and between proteins is controlled by the vast number of states available to the polypeptide chain. (A variety of proteins contain metal centers, generally performing functions ranging from the maintenance of structural integrity to catalysis.) The goal of Crane's research is to develop and apply new photochemical methods for studying the structural basis of oxidation-reduction chemistry and long-range electron transfer in biology.

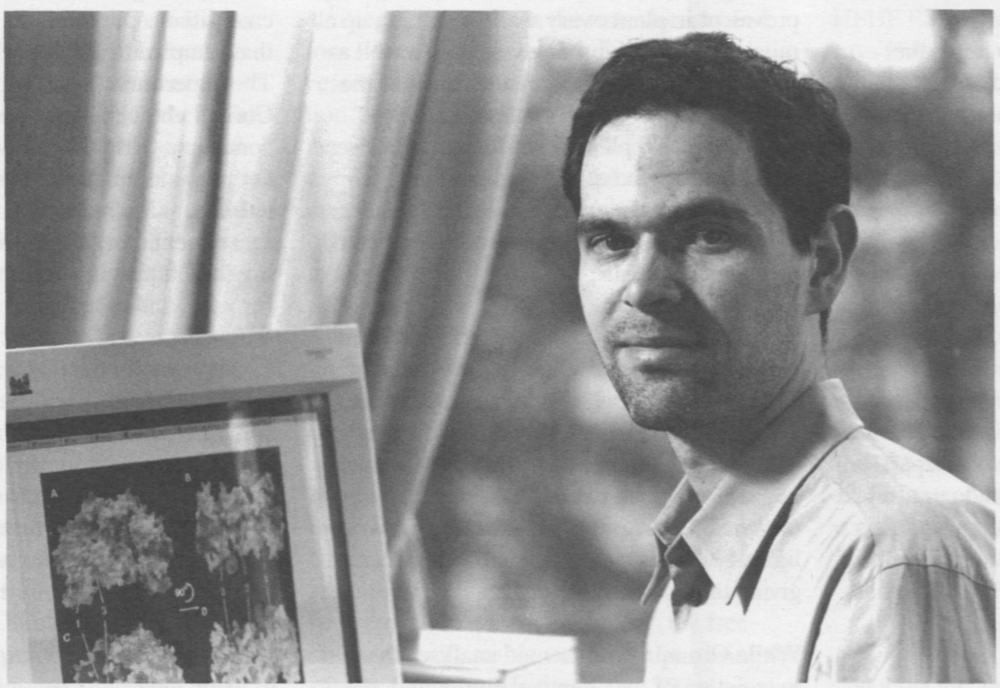
The NSF award is the agency's most prestigious for new faculty members. The program recognizes and supports the early-career development activities of promising teacher-scholars who are considered most likely to become the academic leaders of the 21st century.

As a Searle Scholar, Crane will receive a grant of $80,000 a year for three years to support his research into the structural chemistry of biological timing.

The award will support Crane's research program on circadian rhythms, the periodic light or temperature cues by which people anticipate changes in their environment, such as time perception and "jet lag." His research on circadian clock components attempts to understand behavior in terms of structures and reactivities of individual molecules. Although molecular genetics research has identified many clock components in plants, fungi, and mammals, details of their structures, interactions, and chemistries remain to be understood. Because the essence of clock function concerns how information is transferred, Crane aims to determine the structures of the functionally relevant protein complexes.

The Searle program was established in 1980 and was funded by the estates of John. G. Searle and his wife. John Searle was the grandson of the founder of G.D. Searle, the international pharmaceuticals concern, now a unit of Monsanto Co. The annual awards of 15 three-year grants are intended to support independent research by exceptional young faculty in the biomedical sciences and chemistry.

Crane obtained his B.Sc. at the University of Manitoba, Canada, in 1990 and his Ph.D. in macromolecular and cellular structure and chemistry at Scripps Research Institute in 1996. Before joining the Cornell faculty in 2000 he was a research associate at the California Institute of Technology's Beckman Institute. In 2000 he won a Camille and Henry Dreyfus Young Faculty Award, and this year he was granted a Research Corporation Research Innovation Award.

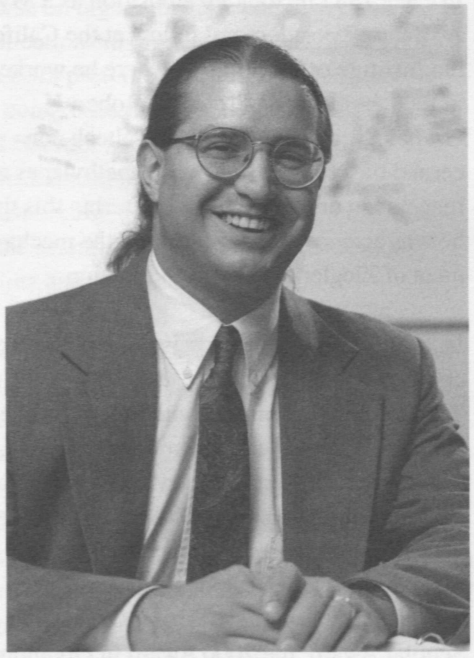


Jon Reis Photography

Brian Crane

John Marohn Wins an NSF New Faculty "Early Career" Award

Bill Steele, Cornell News Service



Jon Reis Photography

John Marohn

John A. Marohn, assistant professor of chemistry and chemical biology, is one of this year's recipients of a Faculty Early Career Development Program grant from the National Science Foundation (NSF). Marohn will receive a five-year grant of about $500,000 to support his research.

Early Career awards are the NSF's most prestigious honors for new faculty members, recognizing and supporting teacher-scholars who are considered most likely to become the academic leaders of the 21st century.

Marohn received a B.A. in physics and a B.S. in chemistry from the University of Rochester, both in 1989, and a Ph.D. in chemical physics from the California Institute of Technology in 1996. He worked as a postdoctoral fellow at the National Research Council/U.S. Army Research Laboratory in Adelphi, Md. He was the recipient of a W.R. Grace and Co. Graduate Fellowship.

Marohn joined the Cornell faculty as assistant professor of chemistry and chemical biology in 1999. Since that time, he has also been a member of the Cornell Center for Materials Research.

He is building two new types of ultrasensitive scanned-probe microscopes in which a tiny probe is moved slowly over a surface, to which it is attracted by a magnetic or electric force. By measuring the deflection of the probe, Marohn has been able to measure spin magnetization and electric charge below a surface. He uses these tools for non-destructive study of thin films, including organic conductors and semiconductors, seeking to answer long-standing questions regarding charge trapping and conductivity. Nearly all of the charge initially passed into an organic device gets "stuck" somewhere and is immobile, Marohn explains. Only after the "charge traps" are filled can current flow, and this has stymied the development of high-efficiency organic transistors.

Marohn will use some of the NSF grant to incorporate materials chemistry and the physics behind scanned-probe microscopes into undergraduate courses and to involve undergraduates in materials science research. He also plans outreach to K–12 students.

Clardy and Hoffmann Named Most Cited Authors

Jon Clardy, the Horace White Professor of Chemistry, and Roald Hoffmann, the Frank H.T. Rhodes Professor of Humane Letters, are among the world's most often-cited authors, according to a new web service, ISIHighlyCited.com, and a unit of Thomson Corp.

The free online service, which brings together the publication and career records of preeminent researchers worldwide, culled the Cornell names from Thomson's authoritative ISI Citation Database.

Hammes Receives ASBMB's William Rose Award

Professor Emeritus Gordon Hammes, now Distinguished Service Professor of Biochemistry at Duke University, has been selected to receive the American Society for Biochemistry and Molecular Biology (ASBMB) William Rose Award to be presented later this month in New Orleans. The award recognizes outstanding contribution to biochemical and molecular biological research and a demonstrated commitment to the training of younger scientists, as epitomized by the late Dr. Rose.

McLafferty Elected Foreign Member of the Italian NAS

Announced earlier this year, Peter J. W. Debye Professor Emeritus Fred McLafferty has been elected a foreign member of the Italian National Academy of Sciences. Last month, McLafferty received a diploma during the annual inauguration of the academy. Professor McLafferty's election renews a tradition of long-standing friendship between the academy and United States scientists that dates from 1786.

Spring 2002 Lecture Series Bring Many Prominent Scientists to Cornell

Laughlin Lectures

Heinz Hoffmann, professor of physical chemistry at the University of Bayreuth, Germany, visited the department in early March to deliver the Frank and Robert Laughlin Visiting Professor of Physical Chemistry Lectures. "Surfactants: Small Molecules with Amazing Properties" was the overall title of the series, with individual titles "Fascinating Phenomena in Surfactant Solutions," March 5; "Viscoelastic Surfactant Solutions," March 7; and "Vesicle Phases from Single-Chain Surfactants: Preparation and Properties," March 12.

Hoffmann has been professor of physical chemistry at the University of Bayreuth since 1975. He received the Nernst Award of the Deutsche Bunsengesellschaft in 1976 and the Wolfgang Ostwald Award of the Kolloidgesellschaft in 1995, as well as a Lectureship Award from the Colloid and Interface Chemistry Division of the Chemical Society of Japan in 1998. Hoffmann was the founding chairman (1986) and later the general secretary (1987–2000) of the European Colloid and Interface Society and the chairman of the Kolloidgesellschaft e.V. (1987–1991). He has had appointments as a visiting scientist at the DuPont Company (1984–1985) and as visiting professor at Tokyo Science University (1989). He has published more than 290 papers in the field of colloid and surfactant science.

The year 2002 represented the third occurrence of the lecture series endowed by Robert Laughlin. Laughlin earned his bachelor of science in chemistry from Purdue University in 1951 and his Ph.D. in organic chemistry under A.T. Blomquist at Cornell in 1955. After a year of postdoctoral work at Yale University with William Doering, he began working for Procter & Gamble where his research interests switched to phase science and physical chemistry.

The Frank and Robert Laughlin Chair of Physical Chemistry is intended to rejuvenate experimental phase science, an important subdiscipline of the field of physical chemistry, 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. Previous lecturers were Professor Reinhard Strey from the University of Cologne and Professor H.N.W. Lekkerkerker from the University of Utrecht.

Debye Lectures

Sponsored by the Cornell section of the American Chemical Society, the Debye Lectures bring scientists to the department for a series of lectures and discussions among all members of the department.

The 2001–2002 series will be presented by Professor Stephen L. Buchwald, Camille Dreyfus Professor of Chemistry at Massachusetts Institute of Technology.

Buchwald was born in 1955 in Bloomington, Indiana, where he received his precollege education. In 1977 he graduated with a Sc.B. degree in chemistry, magna cum laude, from Brown University. During his undergraduate years he worked in the laboratories of Professors Kathlyn A. Parker and David E. Cane at Brown University and Professor Gilbert Stork at Columbia University.

He entered Harvard University as a National Science Foundation Predoctoral Fellow in 1977 and received his Ph.D. in 1982. His thesis work, under the supervision of Professor Jeremy R. Knowles, concerned the mechanism of phosphoryl transfer reactions in chemistry and biochemistry.

In early 1982 he took up a position as a Myron A. Bantrell postdoctoral fellow at the California Institute of Technology where he worked in the laboratory of Professor Robert H. Grubbs. Buchwald's work at Caltech concerned the study of titanocene methylenes as reagents in organic synthesis. During this time he was also involved in work on the mechanism of Ziegler-Natta polymerization.

In 1984 he began as an assistant professor of chemistry at the Massachusetts Institute of Technology. He was promoted to tassociate professor in 1989 and to Professor in 1993. He was named the Camille Dreyfus Professor of Chemistry in January 1997. During his time at MIT he has received numerous honors including MIT's Harold Edgerton Faculty Achievement Award, an Arthur C. Cope Scholar Award, the 2000 Award in Organometallic Chemistry from the American Chemical Society, and a MERIT award from the National Institutes of Health. In 2000, he was elected a member of the American Academy of Arts and Sciences. In 2001, he received the town medal from the city of Tours, France. He has been a named lecturer at the University of British Columbia (John G. Moffatt Lecturer), Scripps (Tanabe Research Laboratories Lecturer), the University of Missouri at Columbia (Lloyd B. Thomas Lecturer), McGill (Merck Lecturer), Max Planck Institüt für Kohlenforschung (Karl Ziegler Guest Professor), University of Illinois at Urbana-Champaign (Carl Marvel Lecturer), Marquette University (Haberman Lecturer), Case Western Reserve University (Lubrizol Lecturer), Emory University (Eli Lilly Lecturer), Université de Sherbrooke (Asta-Zeneca Lecturer), Cornell University (Debye Lecturer), and the University of Pennsylvania (Wyeth Ayerst Lecturer).

He is the coauthor of over 200 published papers and 16 issued patents. Along with Professor Eric N. Jacobsen of Harvard University, Buchwald has developed a short course on organometallic chemistry and its applications to organic synthesis. This course has been presented 27 times in pharmaceutical companies throughout the United States and Europe. In addition, Buchwald is a consultant for a number of chemical and pharmaceutical companies and is a member of the scientific advisory board of Rhodia Chirex and Symyx Technologies.

Roessler Lectures

In late April–early May 2002, Dr. Matthias Mann, from the University of Southern Denmark, visited the department to deliver the 2002 series of Roessler Lectures titled "Introduction to Mass Spectrometry Based Proteomics"; "Multiprotein Complexes Elucidated by Proteomics"; and "Cell Signaling Investigated by Proteomic Methods."

The lectures are named in honor of an endowment by the family of Franz Roessler, a German chemist who emigrated to the United States in 1882 to found the Roessler and Hasslacher Chemical Company. The company became part of DuPont in 1930. Roessler's son, Hans, was a student in Cornell's Department of Chemistry in the early years of the century. Roessler family endowments support a named professorship in the Department of Chemistry and Chemical Biology as well as lecture visits by prominent German chemists.

Mann received his Ph.D. from Yale University in 1988, was a senior scientist in the group of Professor P. Roepstorff at Odense University in Denmark and then was group leader in the protein and peptide group at the European Molecular Biology Laboratory in Heidelberg, Germany. In 1998 he accepted a professorial position in the Department of Molecular Biology at the University of Southern Denmark.

He has received several honors and awards including the prize for best article in *Organic Mass Spectrometry* (1991), Mattauch Herzog Prize in Mass Spectrometry (1996), Hewlett-Packard Prize for Strategic Research in Automation of Sample Preparation (1997), Edman Prize by the "Methods in Protein Structure Analysis" Society (1998); Bieman Medal of the American Society of Mass Spectrometry (1999), and the Bernhard and Matha Rasmussens Memorial award in Cancer Research, the Meyenburg Cancer Research Award given by the German Cancer Research Center, and the Fesenius Prize and Medal for Analytical Chemistry given by the German Chemical Society, all in 2001. In 1998 the Institute of Scientific Information named him the second most cited scientist in chemistry.

Aggarwal Lectures

The 2002 Aggarwal Lectures in Polymer Science were given May 20, 21, and 22, with the first two lectures part of the Cornell Center for Materials Research Polymer Outreach Program (POP) Symposium.

Professor Andrew Holmes from the University of Cambridge gave the lectures, titled "Conjugated Polymers for Optoelectronic Applications," "Synthesis in Supercritical Carbon Dioxide," and "Synthesis of Natural and Non-natural Materials—A Matter of Conjugation."

Holmes obtained his B.Sc. and M.Sc. degrees at the University of Melbourne, where he worked with Professor L.M. Jackman. His PhD (1971) on heteroannulenes with Franz Sondheimer at University College London was supported by a Shell (Australia) Science Scholarship. He made the transition to natural products synthesis as a result of a postdoctoral stint at the E.T.H. working on the final stages of the synthesis of vitamin B12 with Professor A. Eschenmoser. Holmes was appointed to an assistant lectureship at Cambridge in 1972. In 1977 he gained tenure and was appointed to a lectureship until he took the position of director of the Melville Laboratory for Polymer Synthesis in 1994. He was promoted to a personal readership in 1995 and to a personal professorship in 1998.

Holmes's research interests span a range of natural and non-natural synthetic targets. In the natural products area he has concentrated on biologically active piperidine and indolizidine alkaloids, marine cyclic ethers, medium ring unsaturated lactams, and the potential application of these materials to alkaloid synthesis and novel peptidomimetics. A recent interest has been the use of phosphoinositides to probe downstream signaling processes in protein kinases.

Holmes developed an interest in conjugated polymers as a result of an interdisciplinary collaboration with Professor R.H. Friend in the Cavendish Laboratory. This group discovered the first polymeric light-emitting diodes that have excited attention around the world and spawned a totally new research area. These materials show great promise as low-voltage, lightweight light sources, and may have a wide variety of applications in such fields as emergency lighting, static display panels, and screens for laptop computers and portable televisions.

Professor Holmes was the recipient of a Leverhulme Royal Society Senior Research Fellowship for 1993–94, the 1994 Alfred Bader Award, and the 1995 Materials Science Award of the Royal Society of Chemistry. He was a 1999 Novartis Fellow and the Dauben Lecturer at Berkeley in 2000. In May 2000 he was elected FRS. He served as a principal editor of the *Journal of Materials Research* (1994–2000) and a member of the Board of Editors of Organic Syntheses, Inc. (1997–2001) and is currently a member of the editorial advisory board of the *Journal of Materials Chemistry,* and chairman of the Editorial Board of *Chem Comm.*

Chair's Notebook

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and sophistication of the research programs that my younger colleagues are putting together. As I think back to my own beginnings in the department, I can only hope that the quirky little proposals that started my research efforts have been irretrievably lost in some dusty archive!

Because the focus of my first two columns has been the future of the department, the description of the accomplishments of my colleagues has naturally emphasized the contributions from the younger members. However, I would not want to give the impression thereby that the more senior professors are asleep at their desks! Indeed, one of the hallmarks of the department has been the ability of a number of the faculty to maintain vigorous research programs throughout careers of considerable length. Among those in this category, two celebrated decennial birthdays last fall—Harold Scheraga, his 80th and Simon Bauer, his 90th (see pages 4 and 5). The remarkable scientific contributions that these two individuals have made, and continue to make, were emphasized repeatedly in the symposia that were held in their honor. That as many distinguished scientists from as many parts of the world came to these celebrations was, by itself, a powerful demonstration of the respect that the honorees have earned.

But let me return to the main theme of this column by reporting on the third of the foundations for my optimism: the prospects for a new building. After a period of some uncertainty, that too seems solidly on track for realization within the next few years. On April 30, 2002 President Rawlings and Provost Martin announced the New Life Sciences Initiative—a major ($400–$500 million) commitment to the development of science and engineering that is related to biology and medicine. Included within the initiative is a new building in the Baker-Olin-Clark precinct, which, in combination with renovation of our existing space, will allow us to provide world-class laboratories and classrooms not only for the current faculty and students but also for those who will be joining us as the department expands to its authorized strength of 35 research groups. Obviously, the green light for building construction presages a lot of hard work for the many people who will be involved in the fund raising for and planning of the new space, but it is not hard to find the motivation for this kind of work when the payoff is so great!

Drop us a line!

Updating our Alumni and Friends databases is an ongoing task. The next time you have a spare moment, please send us a quick note to update your mailing and career information. Send mail to Kelly Strickland at the address below or e-mail (kss1@cornell.edu).
Thank you.

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Chemistry and Chemical Biology *is published twice a year by the Department of Chemistry and Chemical Biology at Cornell University.*
Barry Carpenter, Chair; Earl Peters, Executive Director Emeritus; Kelly Strickland, Managing Editor

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and Chemical Biology
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Ithaca, NY 14853-1301