Cornell Chemistry

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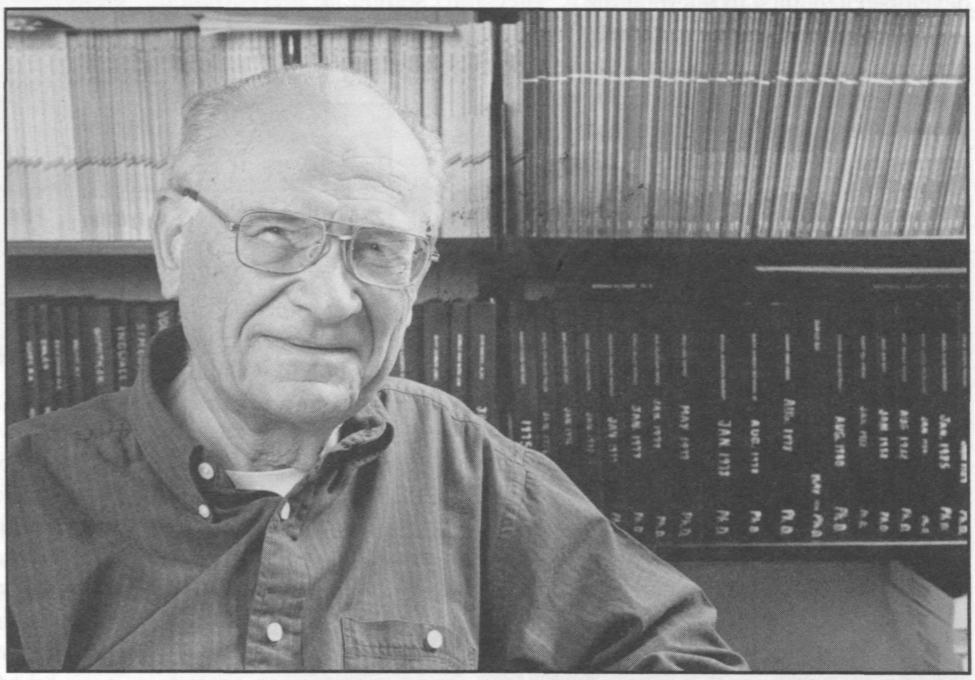
CHEMICAL BONDS

OCTOBER SYMPOSIUM MARKS SCHERAGA'S 75TH BIRTHDAY

Former students, postdoctoral fellows, and research colleagues of Harold Scheraga will convene in Baker Laboratory on October 19 for a major symposium in honor of their mentor's 75th birthday on the day previous. Many attendees, researchers from the nation's top universities and from international institutions, are now premier protein scientists and noted biophysical chemists in their own right, and all have studied and worked with Scheraga at Cornell over a distinguished career that spans nearly 50 years.

Professor Scheraga is remembered by generations of Cornell scientists for his outstanding "protein course," Physical Chemistry of Proteins, and for his general physical chemistry lectures before undergraduate classes. He arrived at Cornell in 1947 after a year at Harvard Medical School as an American Chemical Society Postdoctoral Fellow. In the post-Sputnik expansion of scientific research and education, Scheraga presided as chairman of a fast-growing chemistry department (1960–67). During his tenure as chairman he oversaw the construction of Olin Laboratory, still known by some as the "new addition" to the department's facilities.



Harold Scheraga, 1996

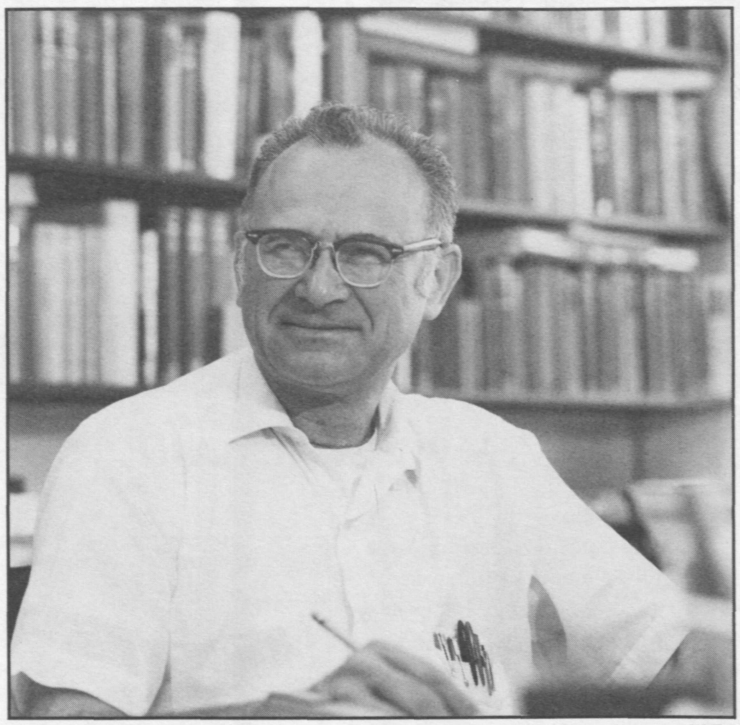
Scheraga was a younger protégé of Leo Mandelkern and Cornell's Nobel laureate Paul Flory in early studies of proteins and other polymers, going on to pioneer the development and application of physico-chemical methods to understand interactions in model polypeptides, in proteins, and between enzymes and substrates. He was first to recognize the implications for physical chemistry in the discovery (by Anfinsen) that amino acid sequences dictate the three-dimensional structures of particular proteins.

This "protein folding" problem has intriqued him for nearly four decades, according to former research associate David Rothwarf, now a postdoctoral associate at the the University of California, San Diego. "He's problem-oriented," says Rothwarf in a moment of sublime understatement. Scheraga's

> "Harold Scheraga has been one of the very few constants in the extremely trendy world of top-notch science. Harold always knew that predicting protein folding was the central problem. He not only provided the field with stability, he made many of the key contributions to it."
>
> —Michael Laskowski, Purdue University

research on the question, he observes, is "both experimental and computational. He wants to be able to predict the structure from the sequence." Scheraga's colleague Professor Barbara Baird adds, "Harold represents an awesome combination of scientific patience and urgency. His group's rigorous study of proteins has involved many hundreds of person years of unrelenting effort. Yet, every moment counts for him."

Within this general elucidation of the physicochemical properties of proteins, Scheraga's specific contributions have significantly defined the field of inquiry and the methodologies in wide use. He developed a method to interpret the hydrodynamic properties of proteins; his computations of the structure of water and aqueous hydrocarbon solutions showed a physical basis for hydrophobic interactions; he provided an analysis of the helix-coil transition in homo- and copolymers of amino acids, determining the intrinsic helix-forming tendencies of specific amino acids; by ingenious experimentation he determined structurally relevant distance constraints in ribonuclease; he elucidated the mechanism of the thrombin-induced conversion of fibrinogen to fibrin in blood clotting, leading to his identification of a molecular basis for a specific bleeding disorder; he determined the folding pathways of ribonuclease A; he developed the field of conformational energy calculations on proteins, which has a bearing on his further solution of the multiple-minima problem for oligopeptides and fibrous and globular proteins.

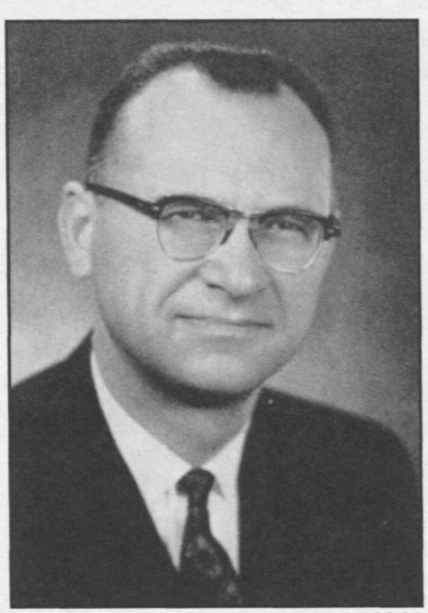


1976

Four of Scheraga's nearly 1,000 scholarly papers were designated "citation classics" by *Current Contents,* and, according to a 1982 issue of the same journal, he is the most frequently cited physical chemist in the world. In 1990, he was considered one of 10 most likely candidates for the Nobel Prize—the only protein chemist in the list.

Scheraga's list of honors, awards, visiting lectureships, memberships, advisory panels, consultancies, and editorial posts covers pages. Noteworthy highlights are the American Chemical Society's Eli Lilly Award in Biochemistry (1957), ACS Kendall Award in Colloid or Surface Chemistry (1978), ACS Pauling Medal (1985), ACS Mobil Award in Polymer Chemistry (1990), ACS Repligen Award for Chemistry of Biological Processes (1990), and the Stein and Moore Award of the Protein Society (1995). He is an elected member of the National Academy of Sciences (1966) and of the American Academy of Arts and Sciences (1967).

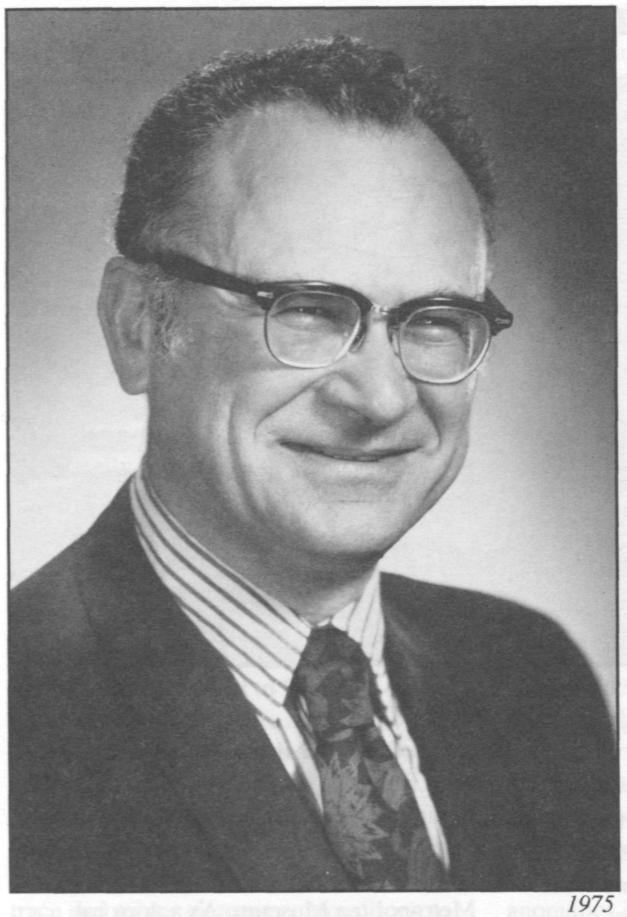
In 1965 he was named George W. and Grace L. Todd Professor of Chemistry,



1964

"What stands out most clearly in my mind are Harold's outstanding talents as a scholar and teacher. Among his greatest accomplishments are the several generations of scientists he has trained and provided to the scientific community. As an undergraduate at Cornell, I was recruited into biophysical chemistry by Harold's clear and inspirational lectures in physical chemistry and later in the Physical Chemistry of Proteins. He elegantly developed the basic concepts of thermodynamics and statistical mechanics that would form the basis of my graduate and postdoctoral training and provide me with my scientific religion. I feel very lucky to have had Harold as my teacher and mentor."

—Gaetano T. Montelione, Rutgers University



1975

"Protein folding is an extraordinarily complex problem. What impressed me was Harold's ability to break it down to smaller components using studies of inter-atomic interactions, longer-range ordering, thermodynamics, and statistical mechanics—all tightly coupled to experimental observations. Furthermore, he could explain it so that a novice thought he understood.

"When I was in Harold's laboratory we would sometimes feel that the problems we worked on were too complex, and we would never make enough progress. Several times when this malaise was gripping the lab, Harold would present a research lecture. We were astonished to see what progress we were making! This reflected Harold's wonderful ability to see through complexities and to integrate information from multiple sources. It also reflected his boundless enthusiasm and his tenacity in working towards his goals. He remains an inspiration."

—Fred Maxfield, Cornell University Medical School

and in 1992 he became Todd Professor Emeritus. His venerable age and his emeritus status have not slowed his fearsome pace nor his awesome endurance for work. "His research group, 25 to 30 people, is still very active," Rothwarf remarks without the irony of exaggeration. "And whenever any new technique comes along, any kind of recent technology, he grabs it immediately. He always wants to use a new tool or a new method." Notoriety notwithstanding, Scheraga is remembered as well for his classroom presence. "He put a lot of effort into composing his lectures," Rothwarf recalls.

So it seems appropriate that his former colleagues and students are gathering for this reunion tribute, says Rothwarf, since "he always thinks of the people who worked with him as a scientific family." Distinguished members of that family who will participate in the October symposium include Arnie T. Hagler of Molecular Simulations; Michael Levitt of Stanford University; Jeffrey Skolnick of the Scripps Research Institute; Ken Dill of the University of California, San Francisco; Michael Laskowski Jr. of Purdue University; Alexander Tulinsky of Michigan State University; Walter Englander of the University of Pennsylvania; and Peter Wright of the Scripps Research Institute.

1955

1986

THINGS YOU WOULDN'T FIND ANYWHERE ELSE ON EARTH

Jennifer Mass

Time has not been sparing of art. It erases more surely than the wind. Art conservation is the attempt to reassemble the shards of history, to undo time. And materials scientists, more often than not, are the detectives who trace out this elaborate history.

Jennifer Mass, who earned her chemistry doctorate at Cornell in 1995, has just the curious and fortuitous intellectual history these abstruse matters demand. As an undergraduate, she studied classical art and archaeology; as a graduate chemist at Cornell, she squeezed the odd art course into her curriculum and so came to recognize the not-so-tenuous link between her scientific and artistic interests. "The analytical techniques I was using in my research are the same as those used in art conservation and authentication," she explains. With sophisticated tools of the profession such as powder X-ray diffraction and scanning electron microscopy at her disposal, Jennifer's first career stop is the Metropolitan Museum of Art's Sherman Fairchild Center for Objects Conservation, Fifth Avenue, Manhattan.

Mass did her doctoral work with Professor James Burlitch, studying chromium- and aluminum-doped forsterite (Mg_2SiO_4). The project employed neutron activation analysis and electron spin resonance, techniques well suited to detect minor and trace elements in silicates. Samples bombarded with neutrons form unstable radioactive isotopes that emit gamma rays as they decompose to a more stable product. Each element in the irradiated sample emits gamma rays at characteristic energies that can be identified and quantified. Given that she was already interested in classical artifacts, that she already had sophisticated analytical tools at her command, and that surviving artifacts such as mosaic tesserae and ceramic amphorae and cameo brooches are silicates like forsterite, "I figured object conservation was the way to go. As a conservation scientist, I'm interested in the techniques used to manufacture these materials, in their authentication, and in their deterioration over time."

Strictly speaking, this conservation scientist does little by way of actual object conservation. Her analytical methods are those of a high-tech detective, and what she discovers in the materials that compose ancient artifacts is fit into an elaborate skein of educated surmise about the cultural and ethnological history that illuminates and lends significance to these pieces. She is currently examining mosaic glass from the Roman Empire, glittering fragments of color that date from the first century B.C. to the fourth century A.D. "It was just around the middle of the first century B.C. that glassblowing was invented; it was the beginning of a technological revolution—all kinds of new techniques were being discovered and explored during this period." Not that anyone can attest directly to its origins, since the bits of glass are from a larger collection of artifacts donated to the museum late in the last century. "The shards," she says, "are different types of mosaic ware—vibrantly colored and intricately patterned glass." These are ideal subjects for elemental analysis because "part of the problem is that you don't want to sample whole works of art, but we do have these fragments we can work with. It's a destructive process—I need from one to ten milligrams of sample to mount and polish."

Her chemistry is only one thread of the Cornell connection that leads to the Metropolitan Museum. As a doctoral student, Mass recounts, she enrolled in Art, Archaeology, and Analysis, an inter-departmental elective in the College of Arts and Sciences. The course is taught conjointly by members of the departments of nuclear science and engineering, classics, art, physics, and English and demonstrates "how techniques of physical sciences and engineering are being applied to. . .archaeological artifacts, works of art, and rare books. . .[and] their analysis by modern methods including microscopic, infrared, and X-ray examination and by nuclear techniques . . .Isotopic composition and/or radiographic images are used to identify pigments, inks, clays, etc., to deduce geographical origins, to date and authenticate objects, and to study their creator's techniques."

In short, art appreciation at a different level. "Jim Burlitch let me develop these interests on the side," she recalls. "I think it's unusual that he permitted me to pursue a tangent like this in the middle of an intensive graduate program." The art course, employing techniques already

familiar from her research lab, provided her with the perfect mesh of interests that might, for want of imagination, have proven disparate. Her current occupation, in fact, demands the rather free use of imagination—her reading list has expanded beyond technical articles in chemistry and materials science journals to include medieval historians, geographers, archaeologists, and art historians.

"What I'm looking for," Mass says of her research, "is the technology used to make these colors and types of glass—specifically raw materials used for coloring agents and opacifying agents." The typical opacifying agent used in many of the yellow fragments of Roman glass at the museum is a lead pyroantimonate that also occurs naturally as a mineral called bindheimite. "The deposits of bindheimite closest to Roman glassmaking sites are the ones in the Tuscany region of Italy and on the border of Tunisia and Algeria," she explains. "Right now I am analyzing samples of bindheimite ores from Tuscany, Tunisia, and Algeria. I'm comparing the minerals' trace and minor element compositions to those of yellow Roman glass samples from the Metropolitan collection."

The data she generates from the museum's glass samples reveal not only the material composition of the shards but enable her to extrapolate further facts about technologies of production, geological and geographical provenance of the materials, and in some cases to make educated surmises about cultural and commercial exchanges in a particular region of the archaic world. With all the available data—historical, geographical, mineralogical, chemical, and geological—she anticipates that "we'll learn a lot more about manufacturing techniques, and we'll be able to place these pieces in a rough chronology."

In another of her current investigations, Mass has found evidence to support a widely held suspicion that medieval enamelists plundered mosaics from the ancient world for materials to rework. This notion is suggested in Theophilus's 12th-century treatise *On Divers Art,* where the helpful author remarks that "ancient pagan buildings" are a likely source of high-quality, workable colored glasses. Subsequent elemental analysis made plausible the surmise that medieval craftsmen did in fact re-employ Roman tesserae—mosaic squares—in their own productions (for example, in Mosan and Limoges enamels from the 10th to the 13th centuries), since the opacifying agents of these enamels proved to be typically Roman and not medieval. But while this evidence is telling, the picture is complicated by the presence of medieval glass production in southern France and around Venice, which also, like older Roman production, employed antinomy-containing soda-lime-silica formulations. "Given the possibility of medieval production with 'Roman' compositions," Mass surmises, "it would be helpful to have a method of establishing provenance for these glasses that goes beyond investigation of the major constituents." To accomplish this, she proposes to analyze Roman mosaic glass fragments and tesserae from the Metropolitan collection. If she can find the same anomalies in the composition of this ancient glass as those noticed in medieval enamel artifacts, such as the high magnesium content typical in opaque white Limoges enamels, then she has one more piece of evidence for the source of richly colored glasses used by the medieval crafts guilds.

This elusive history of art, as pursued by Jennifer Mass, is itself a mosaic—recalcitrant tesserae of evidence gathered by the arcane complexities of technology, pieced together in the light shed by radically diverse intellectual disciplines, made comprehensible and convincing in the same careful, incremental way in which a sparkling Roman mosaic or a patient scholastic argument was made.

Her good fortune in the course her professional life has taken is still a source of daily amazement. "Every day," she smiles, "I come to the museum and I can't believe I actually work here. The collection is so spectacular; there's an opportunity to study things you wouldn't find anywhere else on earth. Many of the the things I handle every day, I think to myself, these were made 2,000 years ago."

Jennifer's summer finds her in Pompeii for seven weeks, searching excavations below the level of 79 A.D. for more of those shimmering pieces of glass.

Lab Notes

CORNELL CHEMIST IMPROVES CHANCES FOR CANCER THERAPY

by Larry Bernard, Cornell News Service

Scientists led by a Cornell University chemist have determined the structure of a key protein that binds to a powerful immunosuppressive agent, opening the door to improved cancer treatments and human gene therapy.

The protein, called FRAP, binds to one side of rapamycin, a small, naturally occurring molecule that is known to shut down the immune system. The other side of rapamycin binds to another protein called FKBP12. When all three are bound together, the cell cycle is shut down.

"This is a fascinating story of cell signaling and how information is used, and eventually may lead to making a better immunosuppressive drug," said Jon C. Clardy, Cornell professor of chemistry, who led the work. "It's important also in understanding how proteins interact and how that information can be used to control genes and other cellular processes."

Clardy and co-authors Jungwon Choi, a former Cornell postdoctoral associate now in Korea, and Jie Chen and Stuart Schreiber of Harvard University, reported their work in the July 12, 1996, issue of the journal *Science.* Their work was funded by the National Institutes of Health.

FRAP appears to be an important regulatory protein, related to a growing family of such proteins, Clardy said. Acting as a sort of checkpoint during the cell cycle, this protein halts the cycle at a specific place. "It's like slamming the brakes on and the motor's still running. Everything comes to a halt," he said. That effect means that immune cells, which may be mounting a response to certain treatments, get stopped in their tracks so that therapies can be administered. But it may also mean that the molecule can stop cancer cells from dividing as well. "It causes all cells to arrest. It's a very interesting effect," Clardy said.

The structure has implications in gene therapy. "It's not that hard to introduce new genes. What's hard is turning them on," Clardy said. "Small molecules such as rapamycin may be a good technology for getting a gene to turn on." Such uses may include targeting a defective gene and replacing it with a good gene.

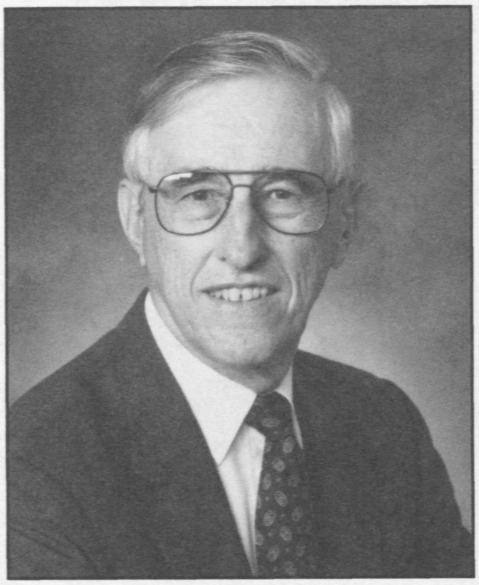
The rapamycin molecule, discovered 20 years ago in a microbe from a soil sample on Easter Island, is "exquisitely shaped" to fit the two proteins, Clardy added. Clardy's group had earlier determined the structure of rapamycin and FK506, another potent immunosuppressive agent bound to FKBP12. Following the cellular pathway, they found that rapamycin and FKBP12 bind together and look for another protein to work with—the protein that ultimately turned out to be FRAP. Rapamycin alone would not bind to FRAP; it needs FKBP12.

"Our data provide a structural framework for understanding the rapamycin-based dimerization of FKBP12 and FRAP," the authors write in their report. "Because rapamycin-induced protein dimerization can form the basis for regulating gene transcription and other cellular processes, such structure-based modifications of the interaction might have important practical consequences. The structure also provides insights into structural features and possible regulation of [this] family of proteins."

Retorts

The puzzlement over the BChem degree, which began back in the November newsletter, continues to bring in the mail. The horse's mouth, **Marty Cooper** BChemE '54, whom we mistakenly listed as our solitary last BChem, isn't a BChem at all. "I believe the confusion. . .rose from the guest registration at the chemistry department's reception during the alumni reunion of 1983. . . . Somehow the 'E' was lost from my degree! As a chemical engineer in those days," Marty writes, "I probably spent more time in Baker Laboratory than most of the chemistry majors and had many friends among the chemistry majors." **Alfred Bennett** AB '33 remembers working "side by side with the few BChems, Class of '33," for whom he felt sympathy. "They never seemed to have an opportunity to come up for air and digest what they were doing. It was one course after another, one laboratory after another, one report after another." Retirement has finally brought **Jack Weikart** BChem '41 up for air, maybe to solve the BChem mystery—he matriculated in 1937 as a BChem. "As I recall, the faculty chose to abolish the BChem [degree] in a meeting in fall '37," Weikart says. "So my class was the last regularly scheduled class to receive the BChem in June 1941. Sure, there were some 'dropouts' or 'step outs,' and they received the degree later. But a degree awarded in '54? I would be interested." **Ellison Taylor** BChem '35 has been doing some sleuthing on this and related topics and discovered that the *Cornellian* for 1935 lists 24 BChems, not the mere 17 we counted from our records. "It's possible one or two were thrown out between the time the *Cornellian* went to press and graduation, but I doubt it." The BChem, man and woman, was a sterling character to the end.

Professor Alfred Blomquist is fondly remembered in a letter from one of his undergraduate advisees, **Leonard Ladin** AB '55, for a sense of humor at once "mordant but always elegantly phrased." Ladin and **Alfred Jr.** AB '55, also a chemistry major, were great friends at Cornell and remain so to this day. "One evening, while studying for a p-chem exam at their house in Cayuga Heights," Ladin recalls, "I was ascending the stairs with his son ahead of me as Professor Blomquist was descending an adjacent staircase. On spotting us, he exclaimed, 'Ah, I see it's the blind leading the blind.' As far as chemistry went he was right on, neither one of us became chemists."



HAMMES GROUP FETES MENTOR

■ About 250 of Gordon G. Hammes's former students and associates from Cornell University and other institutions gathered in Cornell's Biotechnology Building on May 4 for a day-long symposium in his honor. The symposium focused on topics in chemistry, biochemistry, and biophysics. Hammes was a professor of chemistry at Cornell from 1965 until 1989, last serving as Horace White Professor of Chemistry and Biochemistry and director of the Biotechnology Program. He left Cornell in 1990 and is currently vice chancellor for academic affairs at Duke University Medical Center in Durham, North Carolina.

Morning and afternoon sessions were moderated by Professor Barbara Baird of the chemistry department and biochemistry professor George Hess, respectively. The gathering was addressed by Hammes's former students and postdoctoral associates: Jeffrey Steinfeld and Paul Schimmel, Massachusetts Institute of Technology; Carl Frieden, Washington University School of Medicine; T. Gregory Dewey, University of Denver; Lewis Cantley, Harvard Medical School; Richard Cerione, New York State College of Veterinary Medicine; Deborah Leckband, University of Illinois, Urbana-Champaign; and Chen-Wen Wu, National Health Research Institutes, Taiwan.

The symposium concluded with a dinner at the Statler Hotel on the Cornell campus. Professor Hammes was accompanied to Ithaca by his wife, Judy, daughters Laura Hammes Black and Sharon Hammes-Schiffer, and son Stephen '88.

The day was organized by a Cornell committee consisting of Baird, Hess, and Cerione; David Holowka, a senior scientist in the chemistry department; and Susan Coombs from the Biochemistry Program. Assistance came from the Department of Chemistry, the Biological Division, and the CAT Biotechnology Program at Cornell.

■ The Department of Chemistry earned a place in the *Cornell Daily Sun*'s annual readers' poll published in the May 1 issue. *Sun* readers, in one of their rare unanimous moments, voted the organic chemistry sequence a double-whammy—"least favorite" and "hardest" of all Cornell's classes. "Stressed out premeds and science majors turned out in droves to cast their votes," reported the pollster.

■ Professor Jerrold Meinwald delivered the 1995–96 Abe Gelbart Memorial Lecture in the Bard Center Distinguished Scientist Lecture Series at Bard College on May 11. Meinwald's lecture was titled "The Chemistry of Defense, Courtship, and Sexual Selection in the Insect World." In addition to his lecture, Professor Meinwald wielded his renowned flute in concert with a violist, a cellist, and two narrator/pianists in a performance of musical settings of the poetry of Professors Roald Hoffmann and Carl Djerassi, the Stanford University chemist noted for his role in the development of oral contraceptives. Meinwald and the two poet/chemists (both also distinguished scientists in previous Bard lectures) commissioned the musical settings; the Djerassi piece had been performed several weeks previously at the spring meeting of the American Philosophical Society in Philadelphia. Hoffmann's work was premiered last year at Barnes Hall in the Department of Music's "Celebration of Words and Music." A line from Hoffmann might describe the Bard performance: "They vibrated/and sang/in quantized harmony/to absent listeners, to me." And not only to absent listeners.

Professor Meinwald is the sixth Cornellian to participate in the Bard Center series since it was inaugurated in 1979, his predecessors from Ithaca being Michael Fisher, Paul Flory, Roald Hoffmann, Harold Scheraga, and Benjamin Widom.

■ Cornell Chemistry has been awarded an instructional equipment grant of about $30,000 by the Faculty Advisory Board on Instructional Technology (FABIT) in the College of Arts and Sciences. FABIT allocations enable departments within the college to upgrade existing teaching spaces. The money will purchase a high-resolution visual presenter to upgrade the unit currently in Baker 200, and will pay for the acuisition of two liquid crystal display (LCD) projectors—overheads that project a computer monitor onto a lecture hall screen. The new instructional equipment will allow faculty members to employ computer graphics for molecular simulations immediately as they lecture.

ACS Alumni Breakfast

Cornell Chemistry will host its breakfast for alumni and friends attending the American Chemical Society meeting in Orlando. Breakfast will be served Tuesday, August 27, at 7:45 a.m. in Embassy Suites South.

News from Alumni and Friends

1951–60

Marty Cooper BChemE '54 recently retired as manager of space and liquid metal reactors at Westinghouse Electric after 27 years in its nuclear power divisions. "I am presently consulting in the nuclear area and am a research professor in chemical engineering at the University of Pittsburgh. Our research is primarily in coal technology and solid-liquid separations applicable to environmental restoration."

1961–70

Gordon Robinson PhD '64 has been in the product development and merchant banking industry for 25 years—"much feast and famine, many successes, many burials." He spent "18 happy years in Houston after three in New York City, and now eight in Toronto." In addition to the projects one might expect of a merchant banker, he has applied for a patent on the design of a self-righting, quadra-hulled catamaran. His ship may just come in.

Paul R. Resnick PhD '61 is one of six DuPont scientists to be honored with the 1996 DuPont Lavoisier Medal for Technical Achievement. Resnick is a DuPont Fellow working in fluoropolymers at DuPont's Fayetteville, North Carolina, plant. He was recognized for synthesizing a new cyclic fluorinated monomer on a bootleg basis and for preparing polymers and copolymers with tetrafluoroethylene, the process that allowed the commercialization of a new family of amorphous perfluoropolymers known as Teflon.

In addition, Resnick overcame factors inhibiting the production of hexafluoro–propylene oxide, an intermediate in the production of Nafion perfluorocarbon ion exchange resins, by showing how a reaction-sensitive sulfone required to generate a crucial monomer in the process could be safely produced. He also synthesized perfluoro(alkyl vinyl) ethers used in manufacturing commercial fluoropolymers, perfluoroelastomer parts, and fluoroelastomers.

DuPont cites Resnick as "an elegant experimentalist." He holds 62 U.S. patents and is active in the Division of Fluorine Chemistry of the American Chemical Society, which recognized him with its award in 1995.

Dennis Strommen PhD '71 is chairman of the chemistry department at Idaho State University in Pocatello. "For the past 10 years, my research has been in the area of solar energy photophysics. I study molecules with potential as photosensitizers, using Raman and time-resolved resonance Raman spectroscopy." Was it that stint as a doctoral candidate in sun-drenched Ithaca that prepared him for his current research?

1981–90

Charles Goss AB '85, amid the uncertainties of dealing with contractors, taking on the challenge of a new job, and riding out a major corporate merger with his new employer, has moved into a new home in Chapel Hill, North Carolina, and into a position as senior scientist in the analytical sciences department of Burroughs Wellcome in the famed Research Triangle. He is now developing analytical methods to characterize drugs intended for clinical trials, and urges his friends to "ask for Zantac™ by name."

Steve Mirsky MS '85 is to science journalism what Attila the Hun was to the Indo-European economy: he was "a staff writer for *Breakthrough,* a science newsletter, before it folded. He was a staff writer for television's Medical News Network before it folded. He was associate editor of *Sea Frontiers,* an oceanography magazine for a lay audience, before it folded, and a frequent contributor to *Longevity,* a women's health magazine, before it folded." He served as a writer for the alumni publication of the Albert Einstein College of Medicine, was a writing fellow at the Woods Hole Laboratory, and is now a freelance contributor to *Scientific American, Wildlife Conservation, Self, Earth, Men's Fitness,* and *American Way* ("in the seat-back in front of you on American Airlines flights"). These latter publications, Mirsky reports, seem to be holding their own so far.

1991–96

Dong Gon Park PhD '94 is an assistant professor of chemistry at Sookmyung Women's University in Seoul. Dong also moonlights as a cartoonist for *Chemworld,* the official magazine of the Korean Chemical Society. The cartoons feature Dong and his Cornell mentor, James Burlitch, as commentators from the margins.

Alumni Deaths

Errett Hargrove Callahan BChem '27, April 5, 1996, in Lynchburg, Virginia
Florence Davis De Laney BChem '29, August 27, 1995, in Tucson, Arizona
Thomas L. Jacobs PhD '35, October 7, 1995, in Los Angeles
James Magoffin BChem '32, December 2, 1995, in Kingsport, Tennessee

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