2002 ACS NATIONAL AWARD WINNERS

Recipients are honored for significant contributions to chemistry

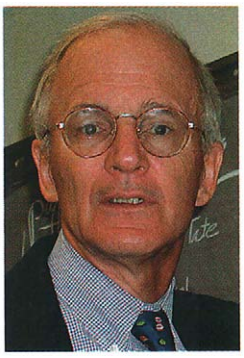
FOLLOWING IS THE SECOND SET of vignettes of recipients of awards administered by the American Chemical Society for 2002. C&EN will publish the vignettes of the remaining recipients in successive January and February issues. An article on Allen J. Bard, 2002 Priestley Medalist, is scheduled to appear in the April 8 issue of C&EN along with his award address.

Most of the award recipients will be honored at an awards ceremony, which will be held April 9 in conjunction with the 223rd ACS national meeting in Orlando, Fla. However, the Arthur C. Cope Scholar recipients will be honored at the 224th ACS national meeting in Boston, Aug. 18–22.

ACS Award in Separations Science & Technology

Sponsored by IBC Advanced Technologies Inc.

Edward L. Cussler, 61, professor of chemical engineering at the University of Minnesota, Minneapolis, has made pioneering contributions to the field of membrane separations. Cussler's creativity; his ability to ferret out promising novel concepts, devices, and separations; and his ability to mesmerize an audience have made him well known to the separations science community.



Cussler

"Cussler's style of low-key mathematics, acute physical insight, and engineering inventiveness has illuminated" a wide variety of separations, notes Rutherford Aris, professor emeritus at the University of Minnesota.

Cussler has provided a chemical understanding of liquid membrane separations, including liquid-impregnated macroporous membranes and reactive membranes. He has determined the factors governing solubilities and mobilities of substances through liquid and reactive membranes and has exploited these properties to achieve strikingly high separation factors.

In the 1970s, Cussler used reactive membranes to selectively increase transport of certain molecules, allowing design of useful separation methods. More recently, he has designed reactive membranes that retard the flux of specific molecules such as oxygen or water, permitting development of protective packaging for products such as food and electronic chips.

In the mid-1980s, Cussler discovered that the sensitive volumetric properties of gels, particularly hydrogels, made them ideally suited to separations applications. He found that a wide variety of driving forces may be used to effect gel expansion and contraction, including cosolvent addition and changes in pH, temperature, and pressure.

Cussler has creatively employed hollow-fiber membranes for gas separation; as microporous membrane reactors; and to gain desirable selectivities in extraction, gas adsorption, and evaporation. He has devised membranes for drying air and for purifying methanol for use in fuel cells. He has even developed an artificial gill that allowed a dog to breathe oxygen under water.

Recent changes in the chemical industry should alter the way scientists approach separations, Cussler says. "Separations in the past have focused either on large-scale separations for commercial materials or very small-scale separations for chemical analysis," he points out. But "in the future, what's likely to be most important are medium-size separations for value-added chemistry."

Cussler graduated from Yale University with a B.S. degree in chemical engineering in 1961 and then went on to earn M.S. and Ph.D. degrees from the University of Wisconsin, Madison, in 1963 and 1965, respectively. After postdoctoral appointments at Wisconsin, the University of Adelaide in South Australia, and Yale University, Cussler accepted an assistant professorship at Carnegie Mellon University in 1967. In 1980, he moved to Minnesota, where he is currently an Institute of Technology professor in the chemical engineering department.

In addition to visiting professorships at Massachusetts Institute of Technology and Cambridge University, Cussler has won numerous awards, including the American Society of Engineering Education Lectureship (1998) and the American Institute of Chemical Engineers W. K. Lewis Award (2001).

The award address will be presented before the Division of Industrial & Engineering Chemistry.—AMANDA YARNELL

ACS Award in Pure Chemistry

Sponsored by Alpha Chi Sigma Fraternity

"Extraordinarily innovative" and "world-leading research" are just some of the phrases that chemists familiar with his work use to describe the contributions of Stanford University assistant chemistry professor **Hongjie Dai.** Although only 35 years old, Dai is already considered a pioneer in the fast-paced world of high-quality carbon nanotubes.

In this fiercely competitive field at the interface of chemistry, physics, and materials science, Dai has set the standard for what a good sample is, according to Charles M. Lieber, professor of chemistry at Harvard University, with whom Dai earned his Ph.D. in 1994. "Prior to Hongjie's work, every group investigating the properties of nanotubes was using crude materials produced by laser ablation or arc discharge," Lieber explains. "It is a testament to Hongjie's efforts that all of the top groups in the world have adopted his ideas and approaches."

Dai uses metal-catalyzed chemical vapor deposition to control the growth of very high quality single-walled carbon nanotubes. He has found ever better ways to limit the size and to control the position and density of the nanoparticles from which his nanotubes grow. This control, in turn, has allowed him to grow patterned, oriented nanotubes from surfaces. He and his students have constructed nanotubes ranging in size from single-nanometer-scale devices to micrometer-scale interconnecting wires.

"Dai has some incredible samples at his disposal, and this has enabled him to make some extremely interesting measurements on nanotubes before anyone else—or at least at about the same time, which is all you can hope for in a field that is in a frenzy," says A. Paul Alivisatos, professor of chemistry and materials science at the University of California, Berkeley.

Dai

Dai can "conceive and carry out really interesting physical studies, as well as make novel samples," Alivisatos explains. For example, "he has measured the electrical characteristics as a tube is pressed on and deformed by an atomic force microscope tip. The results show that the tubes can be massively deformed, and yet they bounce back." In addition, Dai "has shown that the tubes, previously thought to be inert, in fact can be influenced extensively by adsorbed gases, which can donate or remove electrons from the tubes."

Among the early applications of Dai's work are his use of the electronic properties of nanotubes in chemical sensors and the development of some components—such as single-electron transistors and intramolecular p-n junctions—for nanotube-based electronics.

Dai was born in Shaoyang, China, in 1966. He earned his bachelor's degree in physics from TsingHua University, in Beijing, in 1989 and a master's degree in applied sciences from Columbia University in 1991 before joining Lieber's group at Harvard. Following a one-year postdoc with Lieber, he spent two years working with Richard E. Smalley at Rice University before joining the Stanford chemistry faculty in 1997.

The award address will be presented before the Division of Physical Chemistry.
—REBECCA RAWLS

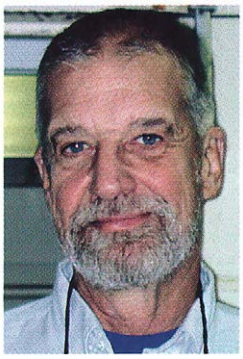
Ernest Guenther Award in the Chemistry of Natural Products

Sponsored by Givaudan-Roure

John W. Daly is an avid fisherman. But in the Laboratory of Bioorganic Chemistry of the National Institute of Diabetes & Digestive & Kidney Diseases (NIDDKD), where he is chief of the section on pharmacodynamics, brightly colored frogs and toads are the stars. For more than 30 years, Daly has been collecting such amphibians from tropical and subtropical regions of the world, isolating and determining the structures of the alkaloids in their skins, and establishing the basis for their biological activities. The unique structures of many of the compounds have provided synthetic challenges to laboratories worldwide.

Many of the alkaloids have become widely used as research tools and as leads for therapeutic agents. For example, batrachotoxins—from a frog used by Colombian Indians to make poison blow darts—are selective activators of sodium channels. Histrionicotoxins, from another Colombian frog, are potent blockers of nicotinic receptor-gated channels. Pumiliotoxins, from a Panamanian frog, have potential use as cardiac stimulants. Epibatidine, isolated in minute amounts from an Ecuadoran frog, acts selectively at certain central nicotinic receptors. It has high analgesic activity, being 200 times more potent than morphine. A nontoxic analog synthesized by researchers at Abbott Laboratories has been in clinical trials for treatment of chronic pain.

Daly's "discovery and characterization over the past four decades of over 500 new alkaloids in skin extracts from frogs and toads from six continents has focused attention on the still-great diversity of undiscovered biologically active natural products," says organic chemist Bernhard Witkop, an institute scholar emeritus at NIDDKD. "The documentation of alkaloid profiles in hundreds of species and populations of amphibians has enriched our knowledge of the ecology and biodiversity of the tropical rain forests."



Daly

In recent years, Daly has provided strong evidence that virtually all of the bioactive alkaloids in frog skin are dietary in origin. The frogs are sequestering them unchanged from their diet of small insects and other arthropods into skin glands for defensive use against predators. The only exception appears to be a lineage of Australian frogs, which synthesizes one of the two classes of alkaloids in their skin. Such work underscores the complex chemical interrelationships between frogs and toads—many species of which are disappearing—and their alkaloid-containing prey. "Subsequent generations will owe Daly a debt of gratitude for recording a world lost to them," Witkop says.

Daly received a B.S. degree in biochemistry in 1954 and an M.A. degree in organic chemistry in 1955, both from Oregon State College, Corvallis. In 1958, after he received a Ph.D. degree in organic chemistry from Stanford University, he joined the National Institutes of Health as a postdoctoral researcher in the Laboratory of Chemistry. He became a permanent member of the staff in 1960, founding chief of the section on pharmacodynamics in 1969, and founding chief of the Laboratory of Bioorganic Chemistry in 1981.

Daly, now 68, was elected to the National Academy of Sciences in 1997. His awards include the Hillebrand Prize from the American Chemical Society (1978), the Award for Outstanding Achievement in the Biological Sciences from the Washington Academy of Sciences (1996), the Research Achievement Award from the American Society of Pharmacognosy (1997), and the Karl Wilhelm Scheele Award from the Swedish Academy of Pharmaceutical Sciences (1999).

The award address will be presented before the Division of Medicinal Chemistry.—MAUREEN ROUHI

James Flack Norris Award in Physical Organic Chemistry

Sponsored by the ACS Northeastern Section

Of **Charles H. DePuy**'s work in gas-phase ion-molecule reactions, a colleague says, "His program has been extremely successful and has provided important new insights into some of the most fundamental issues of organic chemistry through studying reactions in the complete absence of solvation and counterion effects. At the same time, he has revolutionized our understanding of gas-phase ion chemistry by introducing the principles and conceptual framework of organic chemistry."

The technique used in his work is called flowing afterglow, which takes its name from the visible light generated by the quenching of ions in the flow tube downstream from the source. An ion source generates "reagent" ions, which are swept into a tube of helium flowing at 10,000 cm per second and 0.4

torr. Other compounds are injected downstream and undergo bimolecular reactions with the reagent ions. The resulting product ions are detected with a quadrupole.

But ionization of precursors can yield several ion types. And because neutral precursors of reagent ions are also in the flow tube, they can complicate reactions downstream. So DePuy used a selected-ion flow tube (SIFT), in which ions are generated outside the flow tube, and only ions of the "right" mass are accelerated into the flowing afterglow. He also incorporated a triple quadrupole in the system in order to examine the structure of the product ions.

DePuy used the technique to study many of the classical reactions of organic anion chemistry, for example, substitution and elimination reactions, condensations, oxidations, and reductions. Especially noteworthy has been the determination of the gas-phase acidities of organic molecules including the alkanes, benzene and benzyne, ethylene, and others. These values can then lead to bond dissociation energies and other thermochemical data for ions and neutrals. He also carried out studies on boron, phosphorus, silicon, and nitrogen anions and cations.

For example, an indirect kinetic method was devised to determine alkane acidities because alkyl anions are extremely fragile in the gas phase. The process results in adducts that decompose by loss of methane or alkane, plus the corresponding silyloxy anions. From the ratio of methane to alkane lost, as measured by the ratio of the two silyloxy anions, DePuy calculated the acidity of the alkane compared with the known acidity of methane.

In all of this work, organic reactions in the gas phase, which appear on the surface to be strikingly different from those in solution, are shown to be understandable in terms of structure-activity and energy-activity principles derived from classical solution chemistry. For example, isotope effects comparable to those in solution can be detected.

DePuy

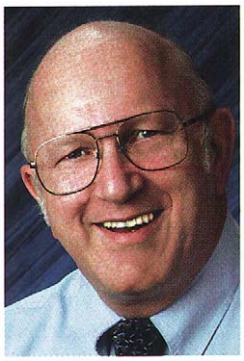
DePuy was born in Detroit on Sept. 10, 1927. He earned a B.S. in chemistry from the University of California, Berkeley, in 1948. He received an A.M. in organic chemistry from Columbia University in 1952 under the direction of organic chemistry professor William von Eggers Doering, followed by a Ph.D. with Doering at Yale University in 1953. After a postdoctoral year with organic chemistry professor Donald J. Cram at the University of California, Los Angeles, he joined the faculty at Iowa State University. He moved to the University of Colorado, Boulder, in 1964 and has been professor emeritus there since 1992.

The award address will be presented before the Division of Organic Chemistry.
—STEVE STINSON

George C. Pimentel Award in Chemical Education

Sponsored by the Dow Chemical Co.

Michael P. Doyle, vice president of Research Corporation and professor of chemistry at the University of Arizona, Tucson, might be thought of figuratively as a landscape architect, for in his 30-year career he has surely changed the national landscape in chemical education by fostering research at undergraduate institutions. For these accomplishments, he will receive the 2002 George C. Pimentel Award in Chemical Education.



Doyle

"I am really very honored by the award," Doyle says. "All my life I have professed that research is an integral component of everyone's education, whether it be high school, college, or Ph.D. student. This award signifies that the community has bought into this as the most relevant educational development of the second half of the 20th century. I firmly believe research *is* education."

Doyle has had a distinguished research career in the area of organic/organometallic chemistry, especially in the development of novel chiral catalysts. Much of this research has been accomplished with undergraduate coworkers. "At one point, I had 18 undergraduate and high school students working full-time during the summer," he says. More than 100 undergraduate students have coauthored one or more peer-reviewed publications with him.

"His impact on chemical education," says Arthur B. Ellis, Meloche Bascom Professor of Chemistry at the University of Wisconsin, Madison, and a well-known proponent of undergraduate education, "extends far beyond his own research and mentorship. Drawing on his experience that research is one of the most effective forms of student education and faculty professional development, Doyle has led a national effort to make undergraduate institutions an integral part of the research enterprise" through his cofounding of the Council on Undergraduate Research (CUR) in 1978, a major resource for college science teachers and students.

Doyle was the first president of CUR and edited its newsletter for 15 years. Under his leadership, CUR grew and now has 3,000 members across the scientific and engineering disciplines representing nearly 1,000 institutions. He also helped found and lead the National Conferences on Undergraduate Research. In this organization, he has helped build bridges between the sciences and the humanities.

Doyle has given hundreds of presentations exhorting chemistry faculty and college administrators to enhance research opportunities. He also edited a book in 2000, "Academic Excellence: The Role of Research in the Physical Sciences at Undergraduate Institutions," drawing on the collective wisdom of the college and research communities.

Doyle was born in 1942 and raised in Minneapolis. He was attracted to chemistry by a high school chemistry teacher who "was about 5 feet tall, but when he got excited about chemistry, he would rise to the ceiling," Doyle recalls. Doyle received a B.S. in chemistry at the College of St. Thomas, in St. Paul, and a Ph.D. at Iowa State University in 1968. He joined Hope College, Holland, Mich., in 1968. In 1984, he became a professor of chemistry at Trinity University. He came to Research Corporation and the University of Arizona in 1997.

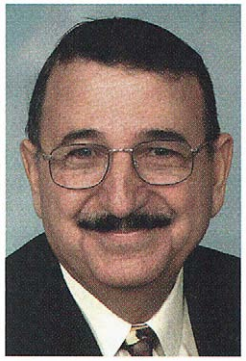
Doyle has been very active in ACS and is also the recipient of numerous awards, including the Camille & Henry Dreyfus Foundation Teacher-Scholar Award (1973–78), the ACS Award for Research at Undergraduate Institutions (1988), the ACS Northeastern Section James Flack Norris Award for Outstanding Achievements in the Teaching of Chemistry (1995), and the ACS Division of Organic Chemistry Paul G. Gassman Distinguished Service Award (1998).

The award address will be presented before the Division of Chemical Education.
—MADELEINE JACOBS

Irving Langmuir Award In Chemical Physics

Sponsored by the General Electric Fund and the General Electric Corporate Research & Development Center

His family may have been thinking "mischievous," but **Mostafa A. El-Sayed** had "experimentalist" written all over him. "As a child, I was always very curious. And sometimes that curiosity got me into trouble," he admits.



El-Sayed

For example, El-Sayed recalls that as a 10-year-old who was fascinated with trains and steam engines, he conducted a steam power experiment. Together with neighborhood friends, the young scientist filled a metal barrel with water, sealed it, and lit a fire under the barrel. "We were trying to make a lot of steam—hoping the barrel would fly away," he recalls.

He made plenty of steam, but the experiment didn't turn out the way he expected. The lid blew off, and boiling water was sprayed everywhere. Luckily, no one was hurt. So started El-Sayed's informal science education.

With high school came chemistry in a more formal setting. "I really enjoyed the subject and had a very good teacher," El-Sayed says. He knew then that science "was the kind of thing I really wanted to do."

El-Sayed moved to Cairo from a nearby town to attend Ain Shams University. Unable, at first, to decide between majoring in chemistry or physics, El-Sayed eventually chose chemistry, finding that subject to be "more alive." He graduated with the school's first graduating class and, after working there for a short while as a chemistry instructor, came to the U.S. and completed a Ph.D. degree in physical chemistry at Florida State University.

In 1961, El-Sayed began an academic career at the University of California, Los Angeles, as an assistant professor of chemistry and was named full professor in 1967. He moved in 1994 to Georgia Institute of Technology, where he established a laser dynamics laboratory and now holds the Julius Brown Chair and Regents Professorship in the department of chemistry and biochemistry.

For some 40 years, El-Sayed has focused on developing and implementing molecular spectroscopy techniques with the aim of elucidating molecular mechanisms and dynamical processes in molecules, gas-phase clusters, organic and inorganic solids, and photobiological systems.

El-Sayed's research on triplet-state dynamics and processes earned him international recognition early in his career. Using techniques developed by his research group, El-Sayed verified experimentally a set of rules that governs relaxation mechanisms in organic molecules. Known as "El-Sayed's rules," the findings account for the observed difference in relaxation and radiative properties of aromatic carbonyls and heterocyclic compounds.

El-Sayed, 68, is also recognized for his contributions in several other areas. In photobiology, for example, El-Sayed is credited with developing techniques for recording resonance Raman spectra of transient species with picosecond time resolution. And in the field of disordered solids, the El-Sayed group is known for applying time-resolved fluorescence line-narrowing techniques to probe the mechanism of triplet-state excitation-energy transport. Recently, El-Sayed turned his attention to understanding and controlling properties of metallic and semiconductor nanoparticles.

El-Sayed is a member of the National Academy of Sciences and the American Academy of Arts & Sciences. He has published more than 415 scholarly publications and has served as editor or advisory board member of numerous journals. He has been the editor-in-chief of the *Journal of Physical Chemistry* since 1980.

The award address will be presented before the Division of Physical Chemistry.

—MITCH JACOBY

Glenn T. Seaborg Award for Nuclear Chemistry

It is rare for the work of one scientist to have important repercussions in several fields of research, but that is the case with Brookhaven National Laboratory (BNL) Senior Chemist **Joanna S. Fowler.** She has made a variety of contributions to the synthesis of organic compounds labeled with radioactive isotopes and has used those labeled compounds for innovative radiotracer research—work that has had impact in chemistry, biology, and medicine.

Of special note are Fowler's contributions to the synthesis of ^{18}F-fluorodeoxyglucose (FDG) in 1976, which accelerated the growth of positron emission tomography (PET) research and is now the most widely used PET tracer in the world. The basic and clinical impact of FDG has mostly been in the clinical neurosciences and in the diagnosis and evaluation of cancer, but it also has an important role in the evaluation of cardiac viability.

Fowler's work with ^{11}C-cocaine is recognized for providing the first assessment of the pharmacokinetics of cocaine in the human brain. Along with her colleague Nora Volkow, she has shown that the major binding site for ^{11}C-cocaine in humans is the basal ganglia and that it is the rapid entrance of cocaine into the brain that is a major factor in its reinforcing effects.

Fowler's approach to mapping human brain monoamine oxidase (MAO) led to the first direct measurement of the turnover rate of MAO B in the living brain. She has used PET tracers to learn that smokers have greatly reduced brain MAO A and B levels, which could result in enhanced activity of dopamine and decreased production of hydrogen peroxide. It supports work suggesting that MAO B inhibition may play a role in the behavioral and epidemiological effects of smoking. The work was cited as one of the "Top 100" science stories of 1996 by *Discover* magazine.

Fowler

Fowler leads the interdisciplinary PET program at BNL, which relies on the contributions of chemists, physicists, pharmacologists, psychiatrists, and other scientists for the study of biochemical transformations and the movement of drugs in the human brain.

The chemical challenge in this work is the extremely rapid incorporation of suitable, short-lived positron-emitting nuclides—such as ^{11}C and ^{18}F—into complex organic compounds that can be used as probes for specific biological targets. Fowler has pioneered basic techniques for synthesis with radioisotopes that overcome the strict limitations imposed by the short half-lives of these nuclides on the synthetic methods that can be used.

Fowler, 59, received a bachelor's degree in chemistry from the University of South Florida, Tampa, in 1964, and a Ph.D. in chemistry in 1967 from the University of Colorado, Boulder. She was a postdoctor-

al fellow at the University of East Anglia, in England, in 1968 and then at BNL beginning in 1969.

Fowler has twice been the recipient of the National Institutes of Health/National Institute of Neurological Disorders & Stroke's Jacob Javits Investigator Award in the Neurosciences—in 1986 and then again in 1993—and she was the 1998 winner of ACS's Francis P. Garvan-John M. Olin Medal. She also received the Paul Aebersold Award from the Society of Nuclear Medicine in 1997 and the E. O. Lawrence Award from the Department of Energy in 1999.

Fowler is a member of the board of Scientific Counselors of the National Institute on Drug Abuse and a member of the board of directors for the Society for Nuclear Imaging in Drug Research. She has more than 300 publications to her credit.

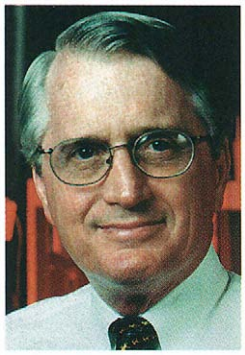
The award address will be presented before the Division of Nuclear Chemistry & Technology.—WILLIAM SCHULZ

Arthur W. Adamson Award for Distinguished Service in the Advancement of Surface Chemistry

Sponsored by Occidental Petroleum Corp.

D. Wayne Goodman began flying airplanes before he learned to drive a car. "I was going to be a jet jock and fly test planes," he says. He even started his undergraduate education as an aeronautical engineering student. But a combination of less than perfect vision and a fascination with chemistry changed all that.

"I had an excellent chemistry instructor who made the material come to life," Goodman recalls of his early college years. And although most of his technical and scientific studies were interesting, "physics and math seemed to be in black and white, while chemistry was in color."



Goodman

Goodman, who currently holds a Robert A. Welch chair in chemistry at Texas A&M University, was born in Glen Allen, Miss., in 1945 and studied chemistry at Mississippi College in Clinton. He earned a Ph.D. degree in physical chemistry from the University of Texas, Austin, in 1974.

After completing his formal education, Goodman conducted research in surface science at the National Bureau of Standards (now known as the National Institute of Standards & Technology)—first as a postdoctoral associate and later as a staff scientist. In 1980, he moved to Albuquerque, where he served as a research scientist at Sandia National Laboratories from 1980 to 1984 and as head of the Surface Science Division from 1985 to 1988. In 1988, he was appointed professor of chemistry at Texas A&M.

Goodman's research career has focused on developing and applying surface analytical techniques to problems in surface chemistry—primarily heterogeneous catalysis. Through some 350 scientific publications, Goodman built an international reputation for establishing key relationships between a catalyst's activity and selectivity and structural properties of its surface. He is well known for elucidating the roles of promoters and poisons in catalytic reactions and for contributing to an understanding of metal-metal bonding in mixed-metal catalysts.

Catalysis researchers praise Goodman's work in quantifying the activity of model transition-metal catalysts over many orders of magnitude of reactant pressure. Goodman has studied several industrially significant reactions, including CO hydrogenation, NO reduction, and alkane hydrogenolysis. His work on well-defined metal catalyst particles on metal oxide support materials is also highly acclaimed.

Goodman's views on ideal and model scientific systems are well known. But less known are his thoughts on ideal and model scientists. Those ideas were formed during his years at NIST working under the direction of two researchers, both of whom are presently professors of chemistry and physics. Referring to them as his "heroes and role models," Goodman describes John T. Yates Jr. of the University of Pittsburgh and Theodore E. Madey of Rutgers University, as "first-rate scientists and gentlemen who enjoy themselves while doing research and always get along so well with people."

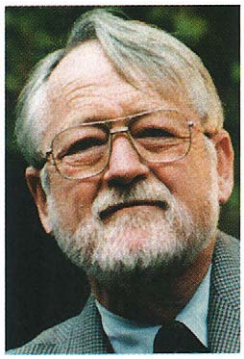
And just as Goodman looks to Yates and Madey as examples of the right way to do science, others look to him. For example, W. Henry Weinberg, professor of chemical engineering and chemistry at the University of California, Santa Barabara, says, "In my laboratory, the policy is clear: All of Wayne Goodman's papers are required reading." Weinberg goes on to say that Goodman's careful and methodical practices—from planning and executing experiments to analyzing and writing up results clearly—should serve as a model for every research scientist.

The award address will be presented before the Division of Colloid & Surface Chemistry.—MITCH JACOBY

Herbert C. Brown Award for Creative Research in Synthetic Methods

Sponsored by Aldrich Chemical Co. Inc. and the Herbert C. Brown Award Endowment

"**Clayton H. Heathcock**'s research over the past quarter century has made him a leading figure in the field of organic synthesis," says a colleague. "And he has made major contributions to education and service to the chemical community as well." Heathcock's research achievements fall roughly into two categories.

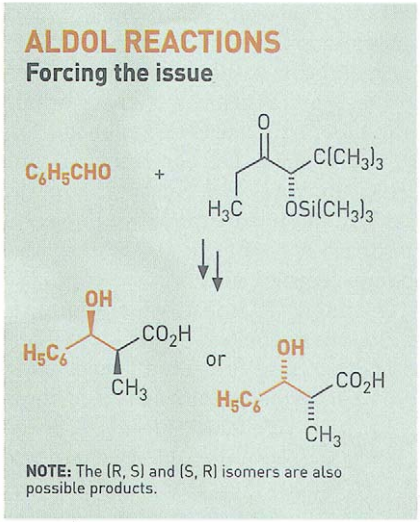


Heathcock

In one, he has mastered the stereochemistry of the acyclic aldol reaction such that he forces the reactants into one or another conformation that leads to the desired diastereomer. This control of stereochemistry during carbon-carbon bond-forming reactions has enabled advances by others both in natural product synthesis and commercial production of drugs as single enantiomers. In the second category, Heathcock has combined the diastereoselective aldol and other reactions to highly efficient syntheses of complex molecules.

At one point, for example, he studied reactions of such aldehydes as benzaldehyde with a single-enantiomer ethyl α-silyloxyalkyl ketone to produce at the end a series of β-phenyl-β-hydroxyisobutyric acids. By preforming a *cis*-lithium enolate of the ketone and adding tetramethylethylenediamine, he got the (*S,S*)-hydroxy acid. A *cis*-boron enolate yielded (R,R). Switching to a *trans*-magnesium enolate afforded the (R,S), while a *trans*-titanium enolate gave (S,R) isomer.

Besides that long and thoroughgoing perfection of aldol methodology, Heathcock has masterminded total syntheses of some



four dozen natural products. And these are not long, plodding campaigns to stitch structures together atom by atom. One can almost hear the drum roll as he sets up formation of a caged pentacycle called methyl homosecodaphniphyllate. The precursor is a long, gangly, unsaturated dialdehyde with one cyclopentane ring. Addition of ammonia triggers a cascade that forms five bonds and closes up the remaining four rings. Telescoping several steps into one-pot reactions results in a nine-step synthesis.

In addition to directing laboratory research, Heathcock has worked in the infrastructure of chemical scholarship. He is coauthor with colleague Andrew Streitwieser of an organic chemistry text. He was chair of the ACS Division of Organic Chemistry in 1985, editor-in-chief of *Organic Syntheses* in 1986, and editor-in-chief of the *Journal of Organic Chemistry* from 1988 through 1999.

Heathcock was born July 21, 1936, in San Antonio. He graduated in 1958 with a B.S. in chemistry from Abilene Christian College in Texas. After receiving a Ph.D. in organic chemistry from the University of Colorado, Boulder, he joined the faculty at the University of California, Berkeley, where he has been ever since. He is currently dean of the College of Chemistry.

The award address will be presented before the Division of Organic Chemistry.
—STEVE STINSON

Ralph F. Hirschmann Award in Peptide Chemistry

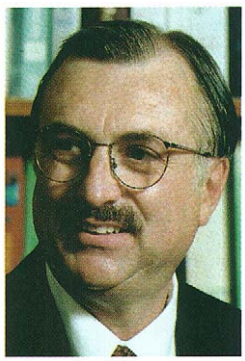
Sponsored by Merck Research Laboratories

Victor J. Hruby, 63, Regents Professor and professor of chemistry and biochemistry at the University of Arizona, is being honored for his contributions to the chemistry of peptide hormones and neurotransmitters and biological analogs. He is responsible for many advances in this field and has applied his basic research on peptide structure and function to many biological and medical problems.

Hruby is particularly renowned for his use of high field nuclear magnetic resonance and other physical methods for the conformational analysis of peptide hormones and analogs and neurotransmitters. His success includes synthesis of conformationally and topographically restricted oxytocin antagonist analogs with prolonged inhibitory activities. These compounds have clinical potential to be agents for blocking premature births.

Other research using a variety of methods—such as computer-assisted molecular modeling, molecular dynamics simulations, and pseudoisosteric cyclization—has led to the design and synthesis of a number of linear and cyclic α-melanotropin analogs and antagonists with very prolonged biological activity and high potency that have a number of possible medical applications, including cancer prevention, and treatment of obesity/anorexia and cardiovascular disease. Peptide analogs of α-melanotropin are currently in clinical trials for erectile dysfunction and pigmentation dysfunctions.

Hruby has also used these methods to design conformationally constrained analogs of enkephalin with delta opioid receptor specificity. These compounds are providing new insights into the conformational and stereoselective requirements of the delta opioid receptor as compared with other receptors. They are powerful tools for studying the physiological role of this opioid receptor. In addition, this research has led to investigations of new ways to treat cancer patients in severe pain with opioid peptides that do not have the side effects and toxicities of current drugs such as morphine.


Hruby

Also in the area of cancer research, Hruby is doing work that focuses on the development of a highly potent and receptor-selective melanocyte-stimulating hormone, conjugates, and analogs for detection and treatment of melanoma cancer. Such compounds could also be used to protect normal cells from damage by UV radiation.

Hruby received his undergraduate and master's degrees in chemistry at the University of North Dakota and a Ph.D. at Cornell University. After completing a postdoc/instructorship at Cornell's Medical College, Hruby began as an assistant professor at the University of Arizona in 1968. Named professor in 1977, he was appointed Regents Professor, the university's highest honor, in 1989. Today, Hruby holds several joint appointments in departments and laboratories at the university, and has served as a lecturer and visiting professor at a number of other institutions around the world.

Hruby's awards and honors stretch back more than 40 years. Among them are the Pierce Award in Peptide Chemistry from the American Peptide Society (1993), the American Diabetes Association Research Award (1986), and the Javits Neuroscience Investigator Award (1987–94). His fellowships are numerous, and he serves on many national science committees, including several for the American Chemical Society. He is editor-in-chief of the *Journal of Peptide Research* and also served in that capacity for the *International Journal of Peptide & Protein Research.* He presently sits on several journal editorial boards, has published more than 900 papers, and has written three books.

The award address will be presented before the Division of Organic Chemistry.
—DAVE HANSON

ACS Award in Colloid Chemistry

Sponsored by Procter & Gamble Co.

When **Charles M. Knobler,** professor of chemistry at the University of California, Los Angeles, started studying monolayers, he "thought they would be a simple system to study the kinds of things" he was interested in. He had already done a great deal of work studying the kinetics of phase transitions in three dimensions, and he wanted to look at two-dimensional systems.

"It turned out that the monolayers themselves were fascinating," Knobler says. "There was so much unknown about them that in order to be able to do my experiments, I had to learn a lot about monolayers. That was 15 years ago, and we're still not completely done with the experiments I wanted to do then."

Knobler's pioneering work in imaging monolayers "opened a new 2-D world," says Howard Reiss, professor emeritus at UCLA. "Until Knobler's work, our under-

standing of the phase behavior of monolayers was inferred from thermodynamic studies. By rendering the structures of monolayers visible, he was able to determine both phase boundaries and the nature of monolayer phases."

"The monolayers were much more complicated than I thought," Knobler says. "Monolayers turned out to be like complex fluids, more akin to things like liquid crystals than to simple substances. We know now that even in simple systems, monolayers may have about a dozen different kinds of phases and that they self-assemble into interesting structures," including star defects, stripes, and spirals, he explains.

Knobler considers the field of complex fluids to be on the borderline between chemistry, physics, and chemical engineering. "Everything I've done has been on this borderline," Knobler says. "I'm a chemist for the way I attack a problem, but I publish in physics journals as often as I publish in chemistry journals."

Knobler likes to describe research as being similar to filling in a crossword puzzle. "You look it over and you say 'there's no way I can solve this puzzle.' Then little by little you fill in a few more words. You do some erasing; you've made some mistakes. Toward the end it fills in very quickly," he says. "That's the fun of research. You suppose a problem that you have difficulty understanding. Then somehow you hope something clicks, and you're able to finish it."

Born in 1934, Knobler received a B.A. in chemistry from New York University in 1955, with minors in physics and English. In graduate school, he started out in a chemistry program at Pennsylvania State University but switched to physics when he received a Fulbright Scholarship to work at Kamerlingh Onnes Laboratory at the University of Leiden in the Netherlands. He received his Ph.D. in molecular physics from the University of Leiden in 1961. He was a postdoctoral fellow in the department of chemistry at Ohio State University and then was a research fellow in the department of chemical engineering at California Institute of Technology. He joined the chemistry faculty at UCLA in 1964.

Knobler

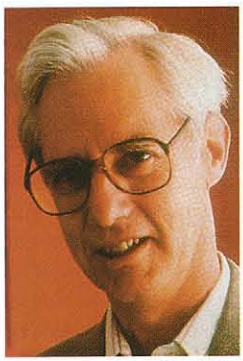
Knobler has received many awards, including the Alexander von Humboldt Senior Award twice—from the University of Mainz in 1990 and from Max Planck Institute, Berlin, in 1998. He is currently a senior editor of the *Journal of Physical Chemistry.*

The award address will be presented before the Division of Colloid & Surface Chemistry.—CELIA HENRY

ACS Award for Computers in Chemical & Pharmaceutical Research

Sponsored by Accelrys Inc.

Before screening the activity of thousands of potential drug compounds in a library, it would be nice to know which ones have the best chance of working well. A computational technique known as docking fills that bill. Docking programs search through big databases of compounds, locating molecules that have ligands that are likely to bind to a target protein. A compound library refined by docking has a much greater percentage of "hits" than one screened randomly.



Kuntz

Twenty years ago, when computer power was still relatively puny, **Irwin D. (Tack) Kuntz**—professor at the University of California, San Francisco, pharmaceutical chemistry department—developed the first docking program. Called DOCK, Kuntz's algorithm scanned the shape of a ligand in a molecule, assessing how well it would fit into a receptor, like a key fits into a lock. Not surprisingly, the popularity of docking programs is beginning to mirror that of combinatorial chemistry, and docking has evolved to become a full-fledged subdiscipline of computational chemistry.

"I think it is probably fair to say that DOCK is the algorithm that was pivotal in starting the revolution in computational structure-based drug design," says one colleague.

Kuntz is also known for his contributions to the research arenas of protein folding and structure determination. In 1979, he wrote one of the first protein-folding algorithms; and in the late 1970s, his group developed a now-ubiquitous technique known as distance geometry, which uses numerous, simply calculated atom-atom distances to determine protein structure. And most recently, he and his colleagues have developed another method for protein-structure determination using intramolecular cross-linking and mass spectroscopy.

In addition to his scientific achievements, Kuntz's personal style has won him admirers. As the late Peter Kollman, a former colleague at UC San Francisco, said earlier this year, "Tack Kuntz is one of the kindest and most supportive persons I have had the good fortune to interact with in my scientific career."

Born in 1939 in Nashville, Kuntz received his bachelor's degree in physical chemistry from Princeton University in 1961. He went on to earn a Ph.D. in physical chemistry from UC Berkeley in 1965. He then returned to Princeton as an assistant chemistry professor, staying there until 1971.

He then moved to UC San Francisco, where he has been ever since, holding various positions, including chairman of the biophysics graduate group from 1987 to 1993; vice chairman of the pharmaceutical chemistry department from 1972 to 1989; and associate dean of research in the School of Pharmacy from 1998 to 2001. He is now director of UC San Francisco's Molecular Design Institute, and is the associate dean of research in the School of Pharmacy.

He is a member of both Phi Beta Kappa and Sigma Xi and is an American Association for the Advancement of Science fellow. He has published more than 200 articles. In addition to numerous teaching awards, Kuntz won UC San Francisco's Faculty Research Lectureship in 1996.

The award address will be presented before the Division of Computers in Chemistry.—ELIZABETH WILSON

AWARD NOTICES

Readers who wish to submit award announcements to C&EN for consideration should send information to Linda Raber, ACS News Editor, 1155—16th St., N.W., Washington, DC 20036. Electronic submissions may be made by e-mail to L_Raber@acs.org. Announcements should include a description of the award (including who sponsors the award and criteria used to select the recipient), a brief biographical sketch of the recipient (including education and professional history), and location and date of award presentation.