ACS 1978 national award winners announced

Following are the 1978 recipients of awards administered by ACS. All awardees will receive their awards at the 175th ACS National Meeting in Anaheim, Calif., next March, except Dr. Orville L. Chapman, who will receive the Arthur C. Cope Award at the 176th ACS National Meeting in September 1978, in Miami Beach. A vignette on Dr. Melvin Calvin, winner of the 1978 Priestley Medal, was published in C&EN, July 11, page 26.

ACS Award in Pure Chemistry

sponsored by Alpha Chi Sigma Fraternity

DR. JESSE L. BEAUCHAMP, professor of chemistry at California Institute of Technology, has made several outstanding contributions to chemistry. Chief among them is the development and application of ion cyclotron resonance spectroscopy (ICR), one of the most important spectroscopic tools developed in the past decade.

Beauchamp has used ICR to study the acidity and basicity of ions and neutrals in the gas phase. As a result of his noteworthy work, rules now can be formulated for predicting the reactivity of ions in the gas phase based on a knowledge of ion structures and charge distributions, simplified energy surfaces associated with ion-neutral encounters, and ion and neutral thermochemical properties. He and his students have looked at a large number of processes such as nucleophilic displacement reactions as well as acid- and base-induced elimination reactions.

He also has pioneered the use of ICR spectroscopy to study metal-ligand interactions and organometallic reaction mechanisms in the gas phase. His research shows that most common chemical reactions in the gas phase proceed through intermediates that are more stable than either the separated reactants or products, and that the reverse situation in solution results from unfavorable solvation of reaction intermediates. This finding has important implications for chemical and biochemical catalysis of molecular transformations. Beauchamp's work, says one admirer, "has put chemists in a position to understand solution chemistry at a much deeper level."

Beauchamp's current research efforts range from plasma physics to surface chemistry. He and his group at Caltech are using photoionization mass spectrometry to study the energetics of ion formation and the effects of reagent vibrational and electronic energy on chemical reactivity. And they are employing conventional light sources and lasers to study the photochemistry of ions in gases. These photochemical studies have provided insights into the acid-base properties of molecules in excited electronic states and are being extended to include investigations of multiphoton dissociation processes using infrared lasers.

He received his B.S. in chemistry, with honors, from Caltech in 1964 and his Ph.D. in chemistry from Harvard in 1967. He joined Caltech in 1967 as Arthur Amos Noyes Instructor in Chemistry. He rose to associate professor in 1971, and professor in 1974.

He is a member of several professional societies, including ACS. Honors include Alfred P. Sloan Foundation Fellow (1968–70) and Camille and Henry Dreyfus Teacher-Scholar (1971–76).

The James Flack Norris Award in Physical Organic Chemistry

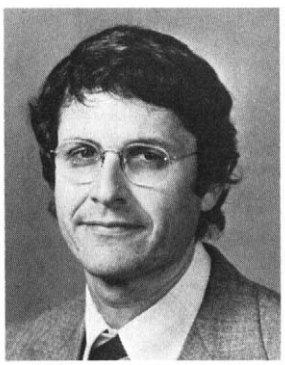
sponsored by the ACS Northeastern Section

"One of the world's truly creative and original physical-organic chemists" is the way one associate describes **DR. JEROME A. BERSON.** "Through the years the hallmark of . . . Berson has been to seek out the most challenging and fundamental physical-organic problems and theories and analyze them in their most minute detail," he adds. And comments are equally laudatory from other colleagues of Berson, who is professor of chemistry at Yale University.

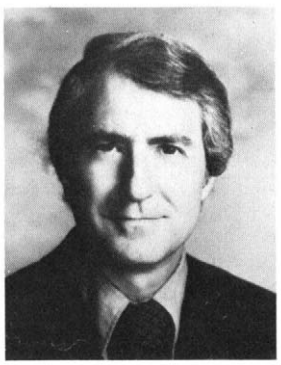
Probably Berson's single most noteworthy contribution has been his series of experiments to delineate the importance of orbital symmetry in dictating chemical reactions. In one of his early studies he explored the stereochemistry of the 1,3-sigmatropic rearrangement of 6-acetoxy-7-deuterobicyclo(3.2.0) hept-2-ene and discovered that such rearrangements may proceed with inversion of configuration of the migrating group. Later he found high stereospecificity in a retrograde homo Diels-Alder reaction, further supporting orbital symmetry theory. In investigating the stereochemistry of the rearrangement of substituted optically active divinylcyclobutanes, he found evidence that forbidden as well as allowed reactions may take place by concerted pathways. These observations and Berson's explanations for them, says a colleague, "should constitute a quantum jump in the evolution of orbital symmetry as a tool for physical-organic chemists."

Berson also has left his mark on areas other than orbital symmetry. Among his more significant accomplishments: the elucidation of the Oxy-Cope rearrangement, further development of the concept of memory effects in multiple carbonium ion rearrangements, preparation of an unusual trimethylene methane biradical, and a clearer understanding of the relative rates of reclosure and rotation of trimethylene and tetramethylene biradicals.

Berson received his B.S. (cum laude) in 1944 from City College of New York. He took his M.S. (1947) and Ph.D. (1949) under Dr. William von Eggers Doering at Columbia University. Following a year of postdoctoral work under Dr. Robert B. Woodward at Harvard University, he joined the faculty at the University of Southern California, Los Angeles, as assistant professor; he became professor in 1958. He taught at the University of Wisconsin from 1963 to 1969, when he moved to Yale.

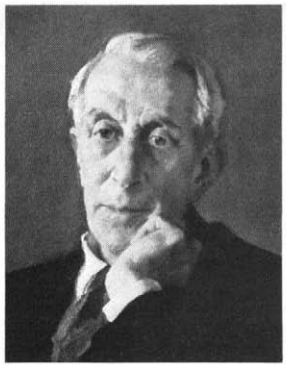


Beauchamp



Berson

Chapman



Emeléus

Ferguson

Arthur C. Cope Award

A long string of outstanding achievements in organic chemistry has brought the 1978 Cope Award to **DR. ORVILLE L. CHAPMAN,** professor of chemistry at the University of California, Los Angeles. These include: the synthesis and characterization of compounds at low temperatures that set new boundaries for the structural theory of organic chemistry; the differentiation between photochemically and thermally generated compounds in reaction sequences; mechanistic and synthetic studies of unusual organic systems; and the elucidation of a mechanism for communication by chemical perception in flying insects.

The list of key molecules the award winner has prepared and characterized at low temperature is impressive: cyclobutadiene, benzocyclobutadiene, methylenebicyclobutanone, benzyne, 9,10-dehydroanthracene, α-lactones, o-quinonemethide, cyclopentadienone, ketone tautomers of phenols, twist-boat cyclohexane, and 1,1,z-trimethylsilaethylene.

In work combining photochemical and low-temperature techniques, Chapman has clarified the mechanism of many photochemical rearrangements. Two of his most noteworthy studies were of the products of the irradiation of 2,4,6-cyclooctatrienone and of the photochemical conversion of bicyclohexenones to phenols.

Unusual and important organic systems he has studied include high yield, nonoxidative photocyclizations, mass spectrometic fragmentation of 2-phenoxy-4,5-benztropone, and multiple triplet mechanisms for cycloaddition of cyclohexenones to olefins.

In studying the mechanism of pheromone perception in flying insects Chapman made two major discoveries. First, moths use a ratio of geometric isomers, not pure isomers, in mate finding. Secondly, he found that varying the molecular structure can be used to send messages into the insect brain that prevent necessary functions such as mate finding. This has huge potential for ecologically sound insect control and tests now are being carried out in many countries.

Following his Ph.D. from Cornell University in 1957 (B.S. in chemistry in 1954 from Virginia Polytechnic Institute), Chapman joined the faculty at Iowa State. He rose to professor at Iowa State, leaving there in 1974 to join UCLA. He received the ACS Award in Pure Chemistry in 1968. He has more than 100 publications to his credit.

Chapman is a member of the National Academy of Sciences (elected 1974) and was the first recipient (1974) of the Texas Instrument Foundation Founders Prize.

ACS Award for Distinguished Service in the Advancement of Inorganic Chemistry

sponsored by Mallinckrodt Inc.

"A teacher affects eternity; he can never tell where his influence stops."—"The Education of Henry Adams."

The influence of **DR. HARRY J. EMELÉUS,** professor emeritus of the University of Cambridge, England, can be measured in part by these comments from students and colleagues: "Perhaps his greatest contribution to inorganic chemistry which makes his influence so internationally profound is the number of excellent students which have been so skillfully trained . . . who now occupy important academic positions . . . and who continue to spread his influence, his great love of chemistry, his enthusiasm for seeking answers to the unknown, and his gentlemanly approach to life and its problems." And: "One of the ways in which Emeléus has given exceptional service to inorganic chemistry is by being the sort of man he is. His influence will last for many years through his students."

Emeléus' career began in 1931 as assistant lecturer at Imperial College of Science & Technology. He had received a B.Sc. in 1921, Ph.D. in 1925, and D.Sc. in 1929 from that school and had done postdoctoral work with Dr. A. Stock at Technische Hochschule in Karlsruhe, Germany (1927) and with Dr. H. S. Taylor at Princeton (1929–31). In 1945 he joined the Cambridge faculty and was named professor emeritus in 1970. That same year he was a foreign professor in North America at Marquette and the universities of Idaho, Washington, and British Columbia.

His research interests range from work in H. B. Baker's Cambridge lab on spectroscopic studies of phosphorescence, preparative inorganic chemistry at Karlsruhe, photochemistry at Princeton, and, during and after World War II, highly reactive fluorine compounds.

He coauthored a book, "Modern Aspects in Inorganic Chemistry," which is now in its fourth edition and, since 1959, has coedited the series on Advances in Inorganic Chemistry and Radiochemistry. He is also cofounder of the *Journal of Fluorine Chemistry.*

Emeléus has received the Harrison Memorial Prize of the Chemical Society (London), the Royal Society's Davy Medal, the Lavoisier Medal from the French Chemical Society and the Stock Medal from the West German Chemical Society. He is a fellow of the Royal Society.

ACS Award in Chemical Education

sponsored by Union Carbide Corp.

DR. LLOYD N. FERGUSON has been an educator for 33 years, beginning as assistant professor at A&T College in Greensboro, N.C., after he had received his B.S. in 1940 and Ph.D. in 1943 from the University of California, Berkeley. In 1945 he joined the faculty at Howard University where he was partially instrumental in inaugurating the Ph.D. program and served as chairman of the chemistry department from 1958 to 1965. Howard currently awards about five to 10 Ph.D.'s a year, a third of the total awarded to black chemists each year. He joined the faculty at California State University, Los Angeles, in 1965 and was chairman of the chemistry department in 1968–71.

Ferguson has written six chemistry books, three of which are textbooks on organic chemistry. He brings zest to his class lectures from his experiences while on sabbatical leaves in Denmark, Switzerland, and Kenya. He has spoken frequently on chemical topics both to local community organizations and through university lecture series. Perhaps most gratifying to him, however, is Ferguson's leadership in motivating black youths to go into science careers, through personal appearances at schools and colleges, as program director of a five-year NIH-sponsored Minority Biomedical Research Program at Cal State, Los Angeles, which involves about 40 students per year, and as chairman of a task force under ACS's Project SEED in 1969–71.

As one colleague remarks, "Lloyd Ferguson stands for all that is excellent in chemical education: a respect and love for students, his colleagues, his fellow man, and learning."

He received the Manufacturing Chemists Association National Teaching Award in 1974, Outstanding Professor Award from Cal State, Los Angeles, in 1974, and the American Foundation for

Negro Affairs Distinguished American Medallion in 1976. Ferguson is a member of ACS, American Association of University Professors, Sigma Xi, and a fellow of the American Association for the Advancement of Science and the Chemical Society (London).

ACS Award in Petroleum Chemistry

sponsored by Lubrizol

An extremely creative researcher throughout his entire career, **DR. ELLIS K. FIELDS** has distinguished himself with hundreds of published research papers and patents. Working at Amoco Chemicals Corp. as senior research associate, the company's highest professional science and engineering position, Fields' work embraces both fundamental basic research and useful applied research.

For many years, Fields has carried out exploratory programs in oil and fuel additives, petrochemicals, polymerizable monomers, hydrocarbons, oxidations, free radicals, and homogeneous and heterogeneous catalysts. His papers report a tremendous number and variety of novel syntheses and reactions, and his patents describe a wide range of unique chemical compositions and their utility.

In the past decade, much of his research has been aimed at studying relationships between mass spectra and more conventional thermal and condensed phase systems. Working on the conviction that parallel reactions in the two contexts reflect similar events at the molecular level, he proved that each clue to reaction mechanisms revealed by mass spectra helped interpret findings in thermal chemistry. Interest in this approach has spawned a tremendous renaissance in the area of pyrolysis.

The American Chemical Society has been the focal point of Fields' professional society activities. Former chairman of the Chicago Section and a national councilor since 1966, he has served on a variety of council committees. He has been on the editorial boards of *Chemical Reviews* and Advances in Chemistry, and is now associate editor of *Petroleum Preprints*, as well as on the advisory board of the Petroleum Research Fund.

Born in Chicago in 1917, Fields received his Ph.D. from the University of Chicago in 1938. After working as an Eli Lilly research fellow until 1941, he joined Research Corp. and then went to Standard Oil (Ind.) in 1950 where he has been ever since, except for a year (1963) as lecturer at Kings College in London. He is a member of the American Association for the Advancement of Science, the Faraday Society, and the Chemical Society (London).

As one of his colleagues says, "Ellis Fields has distinguished himself in a high degree by his service and contributions to petroleum chemistry, organic chemistry, and the chemical profession generally."

Fields

Freiser

Furukawa

ACS Award in Analytical Chemistry

sponsored by Fisher Scientific Co.

A dedicated and inspirational teacher. Strong influence in the development of modern analytical chemistry. Long list of significant research accomplishments characterized by a rare blend of fundamental and applied aspects. These are just a sampling of the glowing terms used by colleagues of **DR. HENRY FREISER** to describe his contributions to the field of analytical chemistry. Freiser is professor of chemistry at the University of Arizona, Tucson.

"He taught the most about analytical chemistry by his attitude towards research, work, and leadership," says one of Freiser's former students admiringly. "He was particularly effective in pointing out that it is necessary for individuals to assume the lead." As department head at the University of Arizona, he helped develop one of the strongest academic analytical centers in the U.S., adds a former postdoctoral student.

Freiser was an early prime mover of the Pittsburgh Conference on Analytical Chemistry & Applied Spectroscopy. Says a colleague, "His strong organizational and technical qualities and his exceptional ability to work with people from diverse backgrounds have contributed much to making Pittsburgh a well-known focal point of analytical chemistry."

Freiser received his B.S. from City College of New York in 1941. He started his graduate career in organic chemistry, obtaining his M.S. in 1942 from Duke University on the direct fluorination of organic compounds. For his Ph.D., from Duke in physical chemistry in 1944, he studied dielectric polarization of aromatic fluorine compounds.

Following brief stints at North Dakota State College, City College of New York, and Mellon Institute of Industrial Research, Freiser was a member of the faculty at the University of Pittsburgh from 1946 until 1958. During that time, he was the first analytical chemist to apply metal chelate equilibrium to the fundamental study of analytical reagents. He left Pittsburgh in 1958 for his present post at the University of Arizona. He was head of the department of chemistry at Arizona from 1958 to 1968.

Freiser's many noteworthy contributions to analytical chemistry cover several interconnected areas. These include significant achievements in solvent extraction, metal chelate chemistry, trace analysis, and ion-selective electrodes. Freiser has more than 200 publications, including two books. His book on solvent extraction is the landmark volume in this area. His other was the first U.S. text to incorporate graphical methods in ionic equilibrium calculations.

ACS Award in Polymer Chemistry

sponsored by Witco Chemical Foundation

"One of the outstanding polymer chemists alive today and certainly the leading scientist in this field in Japan" is how one colleague of **DR. JUNJI FURUKAWA** describes the award winner. Recognizing the importance of alternating copolymerization, the preparation of alternating copolymers of butadiene with acrylics or α-olefins, Furukawa's work has opened up new and important areas of synthetic polymer chemistry and polymeric materials.

In 1969 Furukawa and coworkers prepared a copolymer of butadiene with propylene using a modified Zeigler-Natta catalyst. The properties of this polymer were quite similar to those of natural rubber. Studies of this catalyst and polymer revealed that alternating copolymerization takes place by the alternating coordination of two monomers onto the catalyst system having controlled coordination sites; i.e. the catalyst site linked to the propylene polymer terminal allows a bidentate coordination of butadiene, whereas that linked to the butadiene terminal provides only a monodentate site for propylene owing to the π-allyl nature of the butadiene terminal. Other work led to the finding of another type of alternating copolymerization of butadiene with acrylics by using a Lewis acid together with a transition metal compound.

Furukawa received his B.S. in 1937 and his doctorate in 1943 from Kyoto University. He joined the university faculty

Gillham

Gray

Joullié

in 1939 as a lecturer and was named professor in 1950. He is now with Science University of Tokyo, Chiba.

He has published about 600 papers on polymer and synthetic chemistry as well as two books. He received the Chemical Society of Japan Prize in 1956 and the Oenslager Prize in 1962.

Furukawa is active in the Chemical Society of Japan, High Polymer Society of Japan, and ACS. He is a frequent speaker at international scientific meetings and is on the editorial board of several polymer journals.

ACS Award in the Chemistry of Plastics and Coatings

sponsored by Borden Foundation Inc.

DR. JOHN K. GILLHAM of Princeton University has achieved importance in both the academic and industrial worlds. He is known internationally for pioneering and developing the powerful characterization technique, torsional braid analysis (TBA), in which an inert braid impregnated with polymer forms the active specimen of a torsional pendulum. This approach permits examination of small quantities of polymers throughout the solid and fluid states. Automating and exploiting the TBA technique, together with the discovery of spiral and helical fractures which form around filaments in composite polymeric systems, developing a programable pyrolyzer for studying degradation of polymers, and derivation of the relationship between the macroscopic response of a gas density balance and the molecular weight of a gas, stand as significant contributions. At least four of his devices—the torsional braid analyzer, a programable pyrolyzer, an optical transducer, and a fully automated torsion pendulum—are being manufactured commercially.

Gillham's research in high-temperature polymers (polyhexaalylmelamine, polyimides, polycarboranesiloxanes, and polybenzimidazoles) is noteworthy. His generalizations with cross-linking systems include: three regions of temperature for curing behavior determined by the relative times for gelation and vitrification; two characteristic temperatures T_{gg} and $T_{g\infty}$ for thermosets; and, in two-phase reactive systems, control of morphology and properties using the time to gel. Research with styrene polymers has demonstrated the presence of a molecular weight-dependent relaxation above the glass transition temperature of polystyrene in homopolymers and block copolymers. His laboratory is one of the finest for investigating the temperature-dependent behavior of polymeric materials, involving mainly phase transitions at low temperatures and degradation at high temperatures. The automated TBA torsion pendulum is a major innovation in the former; development of an on-line pyrolyzer interfaced with a new mass chromatograph and a new vapor-phase infrared spectrometer provides a unique facility in the latter. The pyrolysis project is an example of Gillham's original and effective manner of doing research—new devices coupled with those of his own design.

A native of London, Gillham obtained a B.A. (1953) from Cambridge University and a Ph.D. (1959) in chemistry from McGill University. After working at American Cyanamid Co. he joined Princeton University's chemical engineering department in 1965, where he is currently a professor in its polymer materials program.

ACS Award in Inorganic Chemistry

sponsored by Monsanto Co.

" 'A nominee [for the ACS Award in Inorganic Chemistry] must have accomplished outstanding research in the preparation, properties, reactions, or structure of inorganic substances.' I submit that **HARRY GRAY** has made important contributions in *all* of these categories." So states one of his colleagues who nominated Dr. Gray, who is William R. Kenan Jr. Professor at California Institute of Technology.

The man who is recognized as a pioneer in the elucidation of electronic structure of transition metal complexes first worked with Dr. Ralph G. Pearson and Dr. Fred Basolo. After receiving his Ph.D. at Northwestern in 1960, Gray spent a year at the University of Copenhagen working with Dr. Carl J. Ballhausen. He joined the faculty at Columbia University in 1961 and was named professor in 1965. He joined the Caltech faculty in 1966.

Research in iron and copper chemistry led to his present interest in bioinorganic chemistry. "[He] is endowed with formidable intellectual talents, but has in addition good judgment and a good sense of timing. Bioinorganic chemistry is now recognized as a major field in its own right," another colleague remarks. A third colleague adds: "An especially impressive quality is his ability to encompass the total chemistry ... of highly complex systems ... and advance our understanding of them at a very fundamental level."

Gray also has an active research program in the area of inorganic photochemistry, where one of his main interests is in excited-state oxidation-reduction reactions (see C&EN, Aug. 1, page 15).

Gray's previous awards include the ACS Award in Pure Chemistry, Phi Lambda Upsilon Fresenius Award, Manufacturing Chemists Association Award for Excellence in Chemistry Teaching, and the Harrison Howe Award.

Garvan Medal

DR. MADELEINE M. JOULLIÉ, of the chemistry department of the University of Pennsylvania, is respected by her colleagues not only as a good scientist, but also as a dedicated teacher.

Her research interests range widely in the areas of heterocyclic chemistry and medicinal chemistry. One associate says that "her achievements in research show breadth, experimental finesse, and originality. She is a devoted teacher of graduates and undergraduates, in lectures and laboratory."

Joullié's research falls into three broad categories. One area is the study of the reactions of ketene and substituted ketenes with sulfur dioxide. Her group has discovered the existence of an adduct formed from these compounds which undergoes useful cycloaddition reactions with a wide variety of substrates.

Also, she and her coworkers are investigating the synthesis and chemistry of reduced and partially reduced furan systems which are found in many new and biologically active natural products. Current research efforts are directed toward the completion of the stereospecific, optically active syntheses of muscarine and furanomycin.

Third, her group is working on compounds that induce the antiviral substance interferon. Most research in this area has been with macromolecules, but Joullié is concentrating on the small molecule tilorone hydrochloride, which is known to have wide-spectrum antiviral activity in mice.

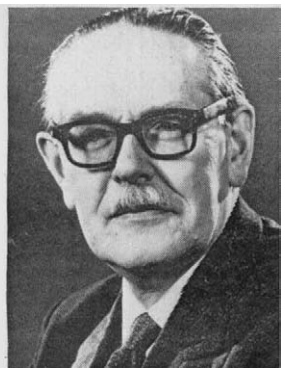
Out of the laboratory, Joullié is an exceptional teacher. She personally teaches more than 250 students each semester, conducts a number of recitations, and supervises a growing group of graduate students. During her career, she has been

a Fulbright lecturer at the University of Brazil, and a visiting professor at Columbia University.

Joullié was born in Paris, but grew up in Rio de Janeiro. She received her B.S. degree from Simmons College. She earned her doctorate from the University of Pennsylvania in 1953 and is now a full professor in the department of chemistry. In addition to belonging to several scientific societies, including ACS (she is a councilor for the Philadelphia Section), Joullié belongs to Sigma Xi, Sigma Delta Epsilon, and Phi Lambda Upsilon honorary societies.

Kuroda

Marcus



Martin

ACS Award for Nuclear Applications in Chemistry

sponsored by G. D. Searle & Co.

The professional career of **DR. PAUL K. KURODA** has been long and varied. He has done research in many areas of nuclear chemistry and geochemistry, and he is known as an international authority in the field of atmospheric radiochemistry. But there are two major scientific discoveries that overshadow the remainder of Kuroda's impressive work.

First was the prediction in 1956 that self-sustaining spontaneous uranium chain reactions could have occurred in nature more than 2 billion years ago. Although this was almost totally ignored at the time, in 1972 it was announced that just such a naturally occurring nuclear reactor had been found at Oklo, in the Republic of Gabon. It was just as Kuroda had envisioned.

Then, in an attempt to explain the differences between the isotopic compositions of xenon in the earth's atmosphere and in meteorites, and to settle a fundamental question on the evolution of the elements, Kuroda postulated the existence of plutonium-244 in nature. This element, extinct on earth, but present in the galaxy, was subsequently found in 1965, and has since been written of in more than 100 papers by chemists, physicists, and astromomers. It is considered direct proof that element synthesis was ongoing in the galaxy at the time of the birth of the sun.

Aside from these remarkable accomplishments, Kuroda has been extremely active in studies of radioactive fallout. His work on fallout from the Chinese and French nuclear tests is especially well known. He also was an early advocate of using natural radioactivity to time natural processes and using isotope pairs of the same element in radioactive measurement. He has done research in fission product measurement, decay schemes, and new isotope discovery.

Born in Japan, Kuroda is an American citizen. He received his Ph.D. at Tokyo University in 1944, and began working at the University of Arkansas in 1952. He has won the Pure Chemistry Award of the Chemical Society of Japan, the Southwest Regional Award and Southern Chemist Award of ACS, and the distinguished faculty award from the University of Arkansas.

Irving Langmuir Award in Chemical Physics

sponsored by General Electric Foundation

DR. RUDOLPH A. MARCUS, professor of physical chemistry, University of Illinois, has made significant contributions in almost every type of reaction kinetics. His contributions to chemical theory have had a tremendous impact both among experimental chemists in a wide variety of fields and among other theorists. Marcus' work includes such topics as the theory of unimolecular reactions, theory of electron transfer reactions in solution ("Marcus theory"), theory of electron transfer reactions ("RRKM theory") at electrodes, and, most recently, "exact" semiclassical theory of inelastic and reactive collisions. Each of these works is generally regarded as among the most significant and far-reaching contributions which have been made in these fields during the past 20 or so years.

In other significant contributions, Marcus has pioneered the use of natural collision coordinates in the literature, formulated a pioneering theory of chemiluminescent electron transfer reactions, provided a curvilinear generalization of activated complex theory, extended vibrationally adiabatic activated complex theory, and reintroduced into the chemical literature the use of action-angle variables which now are used extensively in semiclassical theory. He also extended concepts used in electron transfer theory to atomic and other transfer processes and stimulated further work in that field, described factors inducing vibrational excitation during a reaction, and developed a microcanonical activated complex theory.

Marcus' other contributions include his work on electrostatic properties of polyelectrolytes, a detailed theory of the effects of polar solvents on the spectra of polar solutes, and an order of magnitude theory of solvated electron reactions.

Marcus was born July 21, 1923, in Montreal, Canada. He obtained his B.Sc. (1943) and his Ph.D. (1946) from McGill University. After postdoctoral research at the National Research Council of Canada and the University of North Carolina, Chapel Hill, he joined Polytechnic Institute of Brooklyn in 1951 as an assistant professor. He joined the University of Illinois in 1964. Marcus was chairman of the ACS Division of Physical Chemistry (1964–65).

ACS Award in Chromatography

sponsored by Supelco Inc.

DR. A. J. P. MARTIN has had a long and varied career. His early research involved spectra of substances of biological interest at Cambridge. For his work on vitamin E separation he built a countercurrent apparatus with an efficiency of 200 theoretical plates. Joining the Wool Industries Research Association in 1938 he and Dr. R. L. M. Synge began the collaboration on partition chromatography that was to earn them the Nobel Prize in Chemistry in 1952. Martin also worked on paper chromatography, silica gel zone electrophoresis, and displacement electrophoresis.

In 1946–48 he was in charge of biochemical research at Boots Pure Drug Co., working on penicillin and streptomycin. In research with the Medical Research Council in London he continued his work in partition chromatography with Dr. A. T. James which led to the development of gas chromatography. He also invented the gas density balance and a method of estimating molecular weight of a substance of which only the biological activity is known.

In 1964 he was named Extraordinary Professor of Analogy at the University of Eindhoven, the Netherlands, where he developed displacement electrophoresis with Dr. Everaerts. As a consultant for the Wellcome Foundation in 1970–73 he developed a process for insulin manufacture from the pancreas. In 1973 he became a professorial fellow at the University of Sussex and in 1974 joined the University of Houston faculty as Robert A. Welch Professor of Chemistry.

He has received the Brezelius Medal of the Swedish Medical Society, Franklin Institute's John Price Weatherill Medal,

the Leverhulme Medal of the Royal Society, and the M. S. Tswett Chromatography Medal.

Martin's contributions to chemistry are summed up in these remarks by a colleague: "If one considers the problems scientists would face working in the field of chemistry without the techniques of paper chromatography, liquid partition chromatography, and gas chromatography, one begins to realize the tremendous impact of the man's work in science today .... Today science has many planets revolving around a few stars; Dr. Martin is such a star."

ACS Award for Creative Work in Synthetic Organic Chemistry

sponsored by Aldrich Chemical Co.

DR. SATORU MASAMUNE, professor of chemistry, University of Alberta, Edmonton, Canada, has won international acclaim for his striking synthetic accomplishments and numerous important contributions to methods of synthesis. His major achievements in the chemistry of natural products are the syntheses of diterpenes, alkaloids, the indole alkaloid ajmaline, and the macrolide antibiotic methymycin.

Masamune has made brillant contributions in two areas—complex organic synthesis and theoretical organic chemistry. "In the first area, his beautiful synthesis of the complex alkaloid ajmaline and his work in the total synthesis of methynolide come immediately to mind," states an admirer. "The last mentioned synthesis represents the first synthesis of a complex polyoxo macrolide antibiotic ring system, and the solution of a problem of formidable difficulty, both because of the unusual ring system which embodies a 12-membered lactone, and especially because of the various stereochemical relationships which had to be achieved around the molecule."

Other contributions, also of very high caliber in the area of total synthesis, include his earlier work on the synthesis of diterpene and diterpene alkaloids. These were especially remarkable in that Masamune was the sole author of the several papers in which this work was described. He devised a widely applicable synthesis of a key bridged tricyclic system by internal alkylation of a phenolic ring. Particularly noteworthy in Masamune's contributions to theoretical chemistry are his work on the synthesis and chemistry of the (4) and (10) annulene systems and the examination of the nature of the trishomocyclopropenium and $(CH)_5^+$ species. Masamune's work represents a major contribution to the understanding of bonding, the limits of orbital symmetry control, the effect of strain on reaction rates—milestones in organic chemistry for many years to come.

Masamune was born on July 24, 1928, in Fukuoka, Japan. He received an A.B. from Tohoku University in 1952, and obtained his Ph.D. in organic chemistry from the University of California, Berkeley, in 1957. He was a postdoctoral fellow at the University of Wisconsin and a research fellow at Mellon Institute before joining the University of Alberta in 1964.

The Ernest Guenther Award in the Chemistry of Essential Oils and Related Products

sponsored by Fritzsche Dodge & Olcott

DR. KOJI NAKANISHI, professor of chemistry at Columbia University, is one of the outstanding researchers today in determining the structure of natural products. Many of his studies have focused on terpenes and their derivatives, such as his research on insect moulting hormones and antifeedants produced by plants and on visual pigments.

He also has pioneered the development of new structural methods, using specialized NMR methods and his important exciton chirality method for determining absolute configuration.

Worthy of note, too, is his work on natural products other than those which are strictly considered to be essential oils. Even here, as in his investigation of the fluorescent Y base and other modified nucleic acid bases, "his ability to devise and apply modern structural methods to the elucidation of important chemical structures has been truly unique," points out one of his colleagues.

His current research efforts are focused on studies on visual pigments and retinoids; insect antifeedants and other medicinally active compounds from plants; isolation and structural studies of highly biologically active compounds from various biological sources; and structures of the adducts formed between carcinogenic polyaromatic hydrocarbons and nucleic acids in vitro and by tissue culture.

He has written extensively and his editorial work has led to the production of important books on natural products. He is the author of several of the key chapters in these books as well as a book of his own on IR spectroscopy. He also has played an important role as a director of research and member of the board of governors of the International Centre of Insect Physiology & Ecology in Nairobi, Kenya.

Nakanishi received his B.S. in chemistry in 1947, his Ph.D. in 1954, both from Nagoya University. From 1955 to 1958 he taught at Nagoya as an assistant professor. He moved to Tokyo Kyoiku University in 1958 as professor, then to Tohoku University in 1963. He came to Columbia in 1969.

Among the various honors Nakanishi has received are the Award in Pure Chemistry from the Chemical Society of Japan in 1954, the Asihi Cultural Award in 1968, and his election to the American Academy of Arts and Sciences in 1973. Currently he has some 260 publications.

E. V. Murphree Award in Industrial & Engineering Chemistry

sponsored by Exxon Research & Engineering Co.

DR. DONALD F. OTHMER, Distinguished Professor, Polytechnic Institute of New York, has had a long and highly productive career in industrial and engineering chemistry. With more than 110 patents on his inventions based on fundamental research—often his own and usually as the single inventor in the application of such research for industrial processes—Othmer is a giant in industrial chemistry. He has contributed more than 330 research papers in the world's technical journals; 120 to *Industrial & Engineering Chemistry* during 40 of its 60 years. He also has presented the results and reviews of his work at hundreds of technical meetings throughout the world and in plenary lectures at a score of international congresses. He has advised numerous branches of the U.S. and other governments and many chemical companies in many countries on every continent, some scores of which are also users and licensees of his processes and systems.

As a development engineer with Eastman Kodak Co. (1927–31), he developed the "Othmer still," the first simple, precise system for determining vapor-liquid equilibria. This gave him data to design azeotropic and other distillation processes and plants. For half a century he has been

Masamune

Nakanishi

Othmer

developing processes and engineering plants for separating mixtures of ethyl and other alcohols, ketones, esters, petroleum fractions, and other liquids. These worldwide installations have produced billions of pounds of glacial acetic acid or recovered it after its dilution in processes which have used it as a reagent or solvent for cellulose acetate, aspirin, and other organics—including the high explosive cyclonite (RDX) made in this country and Canada during World War II—and for the extraction of aromatics from petroleum fractions.

Other of Othmer's outstanding contributions to the process industries have been developments of: the first tower extractors of the mixer-settler type utilizing agitators and baffles; evaporation and extraction processes for desalting seawater; a pressure recycling oxidation sewage treatment process; a "wet oxidation" method of burning organic wastes with air or oxygen at high pressures and temperatures; a heating system for pipelines handling resins, sulfur, vegetable oils, and waxes, and the long-distance transport of crude oils.

A native of Omaha, Neb., Othmer is cofounder, coeditor, and member of the editorial board of the Kirk-Othmer Encyclopedia of Chemical Technology, now in its third edition. He joined Polytechnic Institute of Brooklyn in 1932.

James Bryant Conant Award in High School Chemistry Teaching

sponsored by CHEM Study (The Chemical Education Material Study)

SAMUEL H. PERLMUTTER, chemistry teacher at Winston Churchill High School in Potomac, Md., is truly one of the exceptional teachers of science in the country. The quality of his instruction, his excellent rapport with the students, and his inventiveness have won him praise from faculty, school administrators, and parents.

He begins each day by opening the school, as he is the first one there. He schedules six times each day when students can come to him for coaching, tutoring, or to get extra time in the lab. He gives his students his home phone number, if, as a last resort, they need to call him with a problem. He also has enlisted student assistants to help in his classes. They help prepare lab work, study for their own advanced placement, and do some actual teaching.

Perlmutter tries hard to get all students through chemistry. If someone is failing and going to drop out, he offers them the chance to serve for a year as an assistant, for no credit, on the promise that they will take the full chemistry course the following year.

As a result of his methods, many of his students go on to excel in their further studies. They score high on college entrance exams, many have received advanced placement in college, some have won college summer scholarships, and quite a few have gone on into graduate work in chemistry, chemical engineering, and medicine. His efforts to teach what chemistry is about go well beyond the classroom. He has observed science classes being taught in Argentina, the U.S.S.R., and Africa. He has judged science fairs, sponsored a variety of clubs, including one that emphasized careers in chemistry. And he arranges trips for students to scientific research and development facilities in the area.

Born in Cleveland, Perlmutter received his B.S. in chemical engineering in 1931 from Case Western University, and joined the Food & Drug Administration as a chemist in 1935. He worked there until turning to teaching in 1965. He is a member of ACS, National Science Teachers Association, Sigma Xi, and Phi Delta Kappa, and is an emeritus member of the American Association for the Advancement of Science.

Perlmutter

Sakurai

Scheraga

Frederic Stanley Kipping Award in Organosilicon Chemistry

sponsored by Dow Corning Corp.

His "research is characterized by expert novel synthetic work, valuable theoretical insight, and ability to recognize and develop unexpected observations." This is the way one colleague sums up the work of **DR. HIDEKI SAKURAI** in the field of organosilicon chemistry. Sakurai is professor of chemistry at Tohoku University in Sendai, Japan.

Sakurai received his education in the chemistry department at the University of Tokyo—B.Sc. in 1953, M.Sc. in 1955, and D.Sc. in 1958. He taught at the Polytechnic Institute of Osaka City University from 1958 to 1962; he spent one year (1960–61) at Harvard University as a research fellow. The award winner moved to Kyoto University in 1963 and lectured there as an associate professor until 1969, when he was offered a full professorship at Tohoku University.

Over the past 10 years Sakurai has published about 75 papers on organosilicon chemistry. Much of his work at Kyoto centered on polysilanes, where he worked with Dr. M. Kumada. Among his noteworthy achievements there: discovery of the unusual UV spectral absorption of permethylpolysilanes, which advanced the theoretical understanding of these compounds; discovery of several new and significant rearrangement reactions of polysilanes under acid-catalyzed or high-temperature conditions; and pioneering studies of homolytic aromatic silylation by hydrosilanes, which could find use in silicone manufacture.

His more noteworthy contributions, however, have been made at Tohoku University. Sakurai's studies of the electronic spectra of certain organosilicon compounds have been crucial to acceptance of the hyperconjugation model for bonding in these compounds. For instance, he demonstrated that 2-silaindanes don't have the strong, bathochromically shifted absorption found for benzylsilanes. This is because the silicon atom is constrained to the plane of the benzene ring. Also, he has shown that the long-sought trimethylsilylsodium can be synthesized, using hexamethyldisilane, alkali metal, and hexamethylphosphoramide. This compound can be used as a one-electron reducing agent as well as source of carbanions.

Sakurai is a member of ACS and the Chemical Society of Japan, and is a director of the Japan Society of Synthetic Organic Chemistry. In 1967 he received the Kawakami Research Award; in 1974 a visiting professorship from Du Pont. He is author or coauthor of more than 90 papers and three patents.

ACS Award in Colloid or Surface Chemistry

sponsored by Kendall Co.

DR. HAROLD A. SCHERAGA has been an outstanding leader in developing and applying physicochemical methods (hydrodynamics, spectroscopy, and statistical mechanics) to the study of interactions of macromolecules, micelles, and other colloidal systems in water. As expressed by a colleague, "The quantity of Scheraga's work is almost unbelievable. As if this were not enough, the quality of both the theoretical and experimental work is absolutely top-drawer."

Scheraga's research has brought together many diverse areas of chemistry and he has applied them to the study of colloids and macromolecules. His approaches have become imitated widely by colloid chemists. He has published well over 400 papers that testify to the scope of his research, and his methods are used by chemists all over the world.

The multitude of Scheraga's accomplishments includes research on the structure of water, the role of water in colloidal suspensions, development of an empirical potential for water, the role of side-chain hydrophobic interactions in the helix-coil transition and in the stabilization of protein conformation, development of the forerunner of hydrophobic chromatography, and a method to analyze mixtures of large particles. He elucidated the mechanism of thrombin-induced conversion of fibrinogen to fibrin, applied ultraviolet difference spectra to study noncovalent interactions in proteins, characterized the helix-forming ability of amino acids, and made fundamental contributions in the area of electrostatic interactions of polymers.

Finally, in the past several years, Scheraga has opened up the field of conformational energy calculations in polypeptides. His pioneering efforts in this field ultimately have the potential for predicting the three-dimensional structure of proteins from only the amino acid sequence.

Scheraga received his doctorate from Duke University in 1946, and went to Harvard medical school as an American Chemical Society postdoctoral fellow. He began as an instructor at Cornell University in 1947, and is presently Todd Professor of Chemistry.

ACS Award for Creative Invention

sponsored by the Corporation Associates

DR. LEGRAND G. VAN UITERT, "a molecular engineer in the best meaning of the word" is the way a colleague describes the winner of the ACS Award for Creative Invention. "He has been a master at finding materials to fulfill difficult scientific and technological needs," states another. Van Uitert's most important discoveries of new materials have been in five distinct areas: polycrystalline ferrites; lasers and fluorescent materials; nonlinear optical materials; single-crystal magnetic materials; and optical fibers. He, perhaps more than any other single researcher, has provided the chemical insight coupled with an orientation toward useful properties which has brought into being the new generation of ferrites, garnets, and niobates upon which the recent laser, fluorescence, and magnetics technology has been based.

With the discovery of magnetic bubbles a few years ago, Van Uitert was the man who directed the attention of the world to garnets as the material with the best compromise between bubble size and bubble speed. He developed the techniques of growing the single-crystal garnets, making magnetic bubbles both a realistic and practical new electronic approach. More recently, he has contributed to the development of optical fibers which are both low loss and have the radial variation of index of refraction necessary for their practical use in communications systems.

Van Uitert was born in Salt Lake City, on May 6, 1922. He served in the U.S. Navy from 1940 to 1946. He received a B.S. from George Washington University in 1949, and obtained his Ph.D. in 1952 from Pennsylvania State University. That same year he joined Bell Telephone Laboratories, and has spent his entire professional career there as a member of the technical research staff. Presently he is the supervisor of the solid-state materials synthesis group. Van Uitert holds more than 60 U.S. patents and is the author or coauthor of more than 200 papers.

James T. Grady Award for Interpreting Chemistry for the Public

During his eight years as science writer and editor for the *Blade* newspaper in Toledo, **MICHAEL WOODS** has proven himself to be a journalist of exceptional ability. Starting under the guidance of the late Ray Bruner, a former Grady Award winner, he became science editor in 1970. In his time, not only has he succeeded in the often difficult task of explaining complicated chemical processes and controversies to the public, but he has earned the respect of scientists. The American Association for the Advancement of Science, for example, has termed his writing "scientifically distinguished."

While writing for the *Blade,* Woods has had more than 400 bylined articles published that deal substantially with chemistry. He draws heavily on the available literature for ideas and information and attends numerous scientific meetings. Among these are national meetings of the American Chemical Society, AAAS, the Federation of American Societies for Experimental Biology, the American Heart Association, and the American Medical Association. This very close attention to what is happening at the forefront of science has resulted in the appearance of important stories in the *Blade* months before they appear elsewhere.

Among the highlights of Woods' young career has been the first newspaper article published relating the possible effects of chlorofluorocarbons on the environment. Also, he has explored the techniques of fluidized-bed combustion, the mechanism of biological methylation as the explanation for mercury pollution, and the biochemistry of genetics in detail. A continuing series on the controversy around the use of cyclamates in foods, articles on the isolation and synthesis of hypothalamic releasing hormones, and a 12-page newspaper supplement on chemistry's contribution to man have helped place the residents of Toledo among the most scientifically aware in the country.

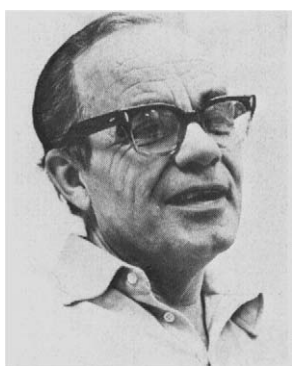
Woods began his career in his home at Dunkirk, N.Y., writing for local newspapers and radio stations. When he graduated from St. Bonaventure with a B.S. degree in biology and minors in chemistry and journalism, he went to the University of Wisconsin where he held a fellowship in science writing. He is a member of the ACS Toledo Section, the National Association of Science Writers, and the Society of Professional Journalists.

ACS Regional Awards in High School Chemistry Teaching

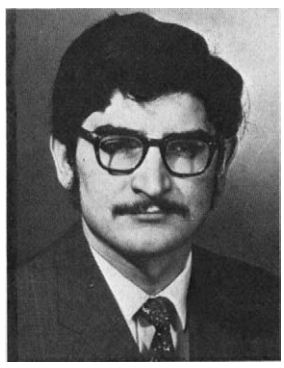
PEGGY D. BAIRD, Great Lakes
BILL M. BRENT, Midwest
STEVE L. COON, Southeast
STEVEN W. FROEHNER, Southwest
J. FAY JACOBSEN, Northwest
LUCY SAMLUCK, Middle Atlantic
RICHARD F. WELCH, Central

ACS Awards for Outstanding Performance by Local Sections

Four awards for different-size sections:
(Large) **DELAWARE**
(Medium Large) **KANSAS CITY**
(Medium Small) **NORTH CAROLINA**
(Small) **CENTRAL WISCONSIN**



Van Uitert



Woods