

MINNESOTA CHEMISTS NEWSLETTER

Department of Chemistry
University of Minnesota, Twin Cities

Spring 1986

A Letter from the Chairman

Larry L. Miller

This spring the Department of Chemistry will undergo a Graduate School-sponsored external review. These reviews take place every 10 years and in preparation we accumulate considerable data about our programs. I now know, for example, that 41 percent of the faculty were added in the past 10 years and that the first Ph.D. in chemistry was awarded in 1902. The historical review rekindled thoughts of outstanding faculty members like **Lind, Smith, Livingston, Maynard, Sneed, Parham, and Lipscomb**, who are no longer with us, as well as recent retirees like **Bryce Crawford, John Wertz, and Ed Meehan**. As many of you know, Bryce was elevated to regents' professor emeritus last June. Since he is still serving as home secretary of the National Academy we thought it appropriate to use the occasion of his retirement to sponsor a Symposium on National Science Policy.

The symposium was held the Friday before homecoming in the hope that it would interest visiting alumni. In fact, we had the largest turnout ever of chemistry alums for homecoming. Alumni attended the Crawford luncheon and Science and Technology Banquet on Friday and the homecoming football game on Saturday. The game was excellent, even though Ohio State eventually won.

(Letter to page 3)



Photo by Stuart Fenton

The late G.B. Heisig and colleagues, ca. 1956. Do you recognize any of them? (See page 4 for Heisig obituary and page 9 for photo key.)

Special Bulletin

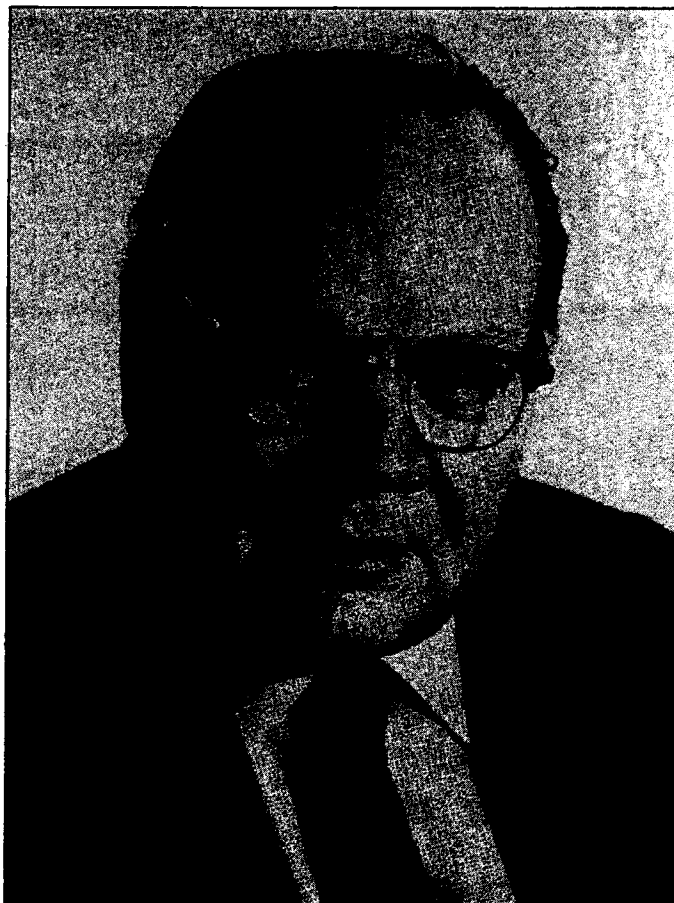
As this issue of the *Minnesota Chemists Newsletter* goes to press, we have learned that Professor **Lou Pignolet** has agreed to be the department chair for a three-year term beginning November 1, 1986. He has our best wishes!

Molecular Spectroscopy— A Continuing Tradition at the University of Minnesota

It is fair to say that molecular spectroscopy is the cornerstone of modern physical chemistry. In fact, it has become an extremely valuable tool in virtually every other area of chemistry as well, and its importance spills over into physics and biology.

Molecular spectroscopy had its origins in the modern quantum theory of matter, which made possible for the first time the interpretations of optical spectra in terms of a molecule's structural and mechanical properties. In the early days of quantum mechanics, however, spectroscopists were

(Spectroscopy to page 2)



*Bryce Crawford retired this past academic year (see *Transition State*, page 4). A symposium was held in his honor (see back page) on October 25, 1985.*

(Spectroscopy from page 1)

concerned mostly with the visible and ultraviolet (UV) spectra of atoms and a few simple diatomic molecules. This was partly for technical reasons: sources and detectors for visible and UV light were readily available. However, spectroscopists of that period also lacked the theoretical tools necessary to tackle the complications introduced by many vibrational and rotational degrees of freedom in absorbing molecules.

The impact of spectroscopy on chemistry was enhanced enormously with development in the mid-1930s of normal mode analysis and group-theoretical methods for describing the symmetries of molecular vibrations. These concepts were first applied to the interpretation of vibrational transitions observed in UV-visible Raman spectra, and provided great motivation for development of infrared spectroscopy.

The first practitioner at the University of Minnesota of what we would now call molecular spectroscopy was **George Glockler**, who came here as a research associate of **S.C. Lind** in 1926 and was appointed to the faculty three years later. Glockler was one of the first chemists to master group theory, which he applied to what was then called the "Raman effect" in polyatomic molecules. A series of papers over the period 1930-40 firmly established Glockler as an early leader in the field. By the time his comprehensive review of Raman spectroscopy was published in *Reviews of Modern Physics* in 1943, optical spectroscopy was recognized as an essential element of modern structural chemistry.

In the meantime, **Bryce Crawford**, who joined the University of Minnesota in 1940, had begun to establish a research program in the new field of infrared spectroscopy. His efforts, along with those of his mentors P.C. Cross at Stanford and E. Bright Wilson at Harvard and a few others, were responsible for the universal and almost immediate acceptance of vibrational-rotational spectroscopy as the principal experimental tool of the chemist studying molecular structure and bonding. At the same time, infrared spectroscopy became a primary analytical tool in organic and inorganic chemistry. Crawford was able to demonstrate that molecular force constants are interpretable, measurable, and transferable from one molecule to another, thus making chemical sense out of what previously had been viewed as a bewildering collection of molecular vibrational frequencies. Among the many triumphs of vibrational spectroscopy for which Crawford has been recognized (see page 4) are the early studies of internal torsional vibrations and hindered rotations about single bonds. Later landmark papers on the normal vibrations of prototype systems such as ethylene and benzene have now become familiar textbook examples, and he made seminal contributions to the interpretation of absolute intensities for molecular absorption spectra.

As Crawford turned a large share of his attention to his new responsibilities as dean of the Graduate School in 1960, the department added to its strength in infrared spectroscopy by hiring **John Overend**, who had been a postdoctoral fellow with Crawford in 1955-58. Overend pioneered the development of high-resolution infrared techniques, which dominated the field for a decade, until the availability of tunable, narrow-bandwidth lasers completely revolutionized spectroscopy. During this period, Overend specialized in determining anharmonic force fields for polyatomic molecules, and was among the first to use computers to optimize molecular

structure calculations by simultaneously fitting hundreds of measured absorption lines. He also enjoyed a collaboration with **Albert Moscovitz** on both experimental and theoretical studies of infrared circular dichroism—the differential absorption of right- and left-handed circularly polarized light by optically active molecules. Before his untimely death last year, Overend established a completely new experimental program in the infrared spectroscopy of molecules adsorbed on metal surfaces, and achieved some of the first definitive results on the vibrational interactions of one adsorbed molecule with another.

In recent years, laser techniques have dominated molecular spectroscopy. The extreme monochromaticity, intensity, and coherence of laser light, compared to conventional sources, have made possible many types of spectroscopy that could scarcely be imagined previously. The increased sensitivity of laser methods also made feasible the spectroscopic study of vast new regimes of chemical samples and processes.

One of the first types of spectroscopy to be changed forever by laser technology was Raman spectroscopy because it does not require continuous tunability of the source frequency. Today, all Raman spectrometers use laser light sources, and state-of-the-art applications of Raman spectroscopy frequently involve exotic new phenomena. Professor **Robert Hexter**, who came to the University of Minnesota in 1969 following pioneering contributions to rapid-scan infrared spectroscopy and the vibrational spectroscopy of molecular crystals, now has an experimental program in surface-enhanced Raman spectroscopy. This technique gives detailed information on the electronic interaction between adsorbed molecules and a metal surface, and therefore has become an important tool of the burgeoning field of surface science.

Other kinds of laser spectroscopy currently being pursued in the department include applications of both structural and kinetic investigations. Professor **Ronald Gentry**, who joined the faculty in 1970, now uses both infrared and visible/UV lasers in molecular beam experiments that probe the microscopic dynamics of isolated molecules and molecular collisions. Gentry has recently studied state-specific unimolecular dissociation processes and state-to-state bimolecular energy transfer processes using lasers both to prepare specific quantum states of molecules initially, and to measure the final distribution of quantum states in the products of molecular collisions. Interestingly, a study on the infrared photodissociation of ethylene van der Waals dimers (C_2H_4)₂ depended critically on the conventional infrared spectroscopy of ethylene, which has been a major triumph of Bryce Crawford some 35 years earlier.

The study of ultrafast kinetic processes is another new field made possible with lasers, and an active program in picosecond (10^{-12} second) spectroscopy was established by Professor **Paul Barbara** when he joined the faculty in 1980. Extremely intense pulses of light only a few millimeters in length are used to probe molecular rearrangements—such as intramolecular transfer of a proton from one position on a molecule to another—and conformational changes in a large molecule that are mediated by interactions with the solvent. Barbara, along with Professors **Gassman**, **Kreevoy**, **Lipsky**, and **Mann**, was responsible for establishing the departmental laser facility in 1984.

(Spectroscopy to page 5)

(Letter from page 1)

Among alumni attending were: **Robert Batdorf**, Reading, Pa.; **Donald Boerth**, North Dartmouth, Mass.; **Charles Carr**, Minneapolis; **Joseph Conrad**, River Falls, Wis.; **Arthur Dickson**, St. Paul; **Robert Eades**, Des Plaines, Ill.; **Ralph Golike**, Wilmington, Del.; **Kurt Heikkila**, Shoreview, Minn.; **Dorothy Johansen**, Mayville, N.D.; **Ronald Kagel**, Midland, Mich.; **Wallace Kirkpatrick**, Minneapolis; **William Krueger**, Kalamazoo, Mich.; **Theron Loveland**, Niles, Ohio; **Jerome Margulies**, Glencoe, Ill.; **Philip Miller**, Chicago, Ill.; **Robert Rinehart**, Arvada, Colo.; **James Scherer**, Berkeley, Calif.; **Glen Swanson**, Watertown, Minn.; **Betty Sullivan**, Bloomington, Minn.; **F. Lowell Taylor**, Forsyth, Mo.; **Donald Theissen**, St. Paul; **Lloyd Thomas**, Columbia, Mo.; and **Brandon Wiers**, Cincinnati, Ohio.

Homecoming activities were organized by **Gladys Olson**, whom many of you will remember. One of her responsibilities over the years has been job placement for graduate students, so she has become acquainted with almost every graduate student and many of the undergraduates. This year nearly 50 companies visited the department and 30 students interviewed for industrial positions. With "Gladys's" help, nearly every student finds a job. She recently took over our alumni relations office. In addition to working on projects like this newsletter, she has increased our alumni mailing list from about 1,100 names in 1983 to 2,300 now. If you want to locate an old friend, let Gladys know; she may have the address. If you move, please let her know your new address.

The success of last year's homecoming has induced us to organize a similar fete for **Bob Brasted** for the 1986 homecoming. Bob has been on our faculty for 39 years and served as director of General Chemistry for 24 years. In June he will become professor emeritus; he will teach at West Point for the 1986-87 academic year. Homecoming this fall will be October 10-11. On Friday, October 10, we will host a luncheon and symposium recognizing Bob's efforts in chemical education and in American Chemical Society activities. If you can possibly attend, mark your calendar now.

As part of my recent accumulation of statistics, I was also able to quantify the increase in the number of female students. The graduate program, for example, in 1974 had 19 women (14 percent) and 112 men. This year we have 52 women (27 percent) and 138 men. Since 1980, when there were no women faculty members, we added **Marian Stankovich** in analytical chemistry and **Essie Kariv-Miller** and **Peggy Etter** in organic chemistry. Next fall, **Doreen Leopold**, a physical chemist, will join us. These women were hired because they are good scientists and teachers. It is, however, useful to remember that they also provide important role models for the increasing number of female students.

Last year's letter mentioned our efforts with computer-aided instruction using microcomputers, a project that is moving along very well. In addition, recognition of the value of supercomputing and cooperation from local computer companies have spurred vigorous expansion by the University of its Minnesota Supercomputer Institute. The center now has two Cray II machines and a Cyber 205.

As part of this expansion, the University established four senior faculty positions in supercomputer applications, and departments initiated competitive searches for qualified candidates. Fortunately, chemistry was successful in this process and Professor **Jan Almlöf** joined us last September. Jan, who was born in Sweden, was a professor at the University of Oslo

in Norway. His specialty is molecular orbital calculations, and with the number-crunching power we have available, he expects to be able to solve problems that were impossible to solve until now. He joins a distinguished group of theorists in our department: **John Dahler**, **Alden Mead**, **Al Moscovitz**, **Steve Prager**, and **Don Truhlar**. It is one of the best groups in the world.

In other news, I note that Smith Hall renovation proceeds as expected. The project is dirty, noisy, and entirely over budget. When finished, it should be great, but not now.

On the brighter side, I want to tell you about the Permanent University Fund. The \$65 million endowment will be used to match contributions from alumni and friends to establish chaired professorships. The University will match contributions of \$250,000 or more. This could generate as many as 130 chairs funded at \$1 million each. It makes the well-publicized Texas program look rather modest.

In closing, I want to express my appreciation to our alumni for the increased interest they have shown in our department. The response is gratifying. We look forward to hearing from you and we would like to have you visit some time. If you would like to join us for homecoming or visit at any time, call Gladys Olson or one of the faculty so we can show you around.

A Message from the Editors

George Barany and Archie Wilson

Greetings again to our faithful alumni! Last year, we enclosed a postage-paid information form, and despite our running afoul of the U.S. postal code, we received a gratifyingly large and enthusiastic response. Hence, the centerpieces of this issue are **your** comments and recollections. We would like to build on this next year, from both new and repeat reporters.

This year we also bring a number of feature articles that may intrigue you. Among the people who gave generously of their time in assembling the information were **Bob Brasted**, **Stu Fenton**, **Ron Gentry**, **Alden Mead**, and **Gladys Olson**. The only compensation demanded by these contributors was to *not* be acknowledged with a by-line! Like last year, **Becky Jackson** performed heroically in tracking down information and producing coherent copy and **Grace Hokanson** dug through files in the accounting office. We thank you all!

Kolthoff Fund Appreciation

Three years ago **Larry Miller** and **Herb Laitinen** organized a campaign to increase the size of the Kolthoff Fund endowment. This fund honors Professor Emeritus **Piet Kolthoff**, and supports a lecture series and fellowships for outstanding graduate students. This year a number of people have contributed generously to the Kolthoff Fund and deserve recognition for their gifts. They are:

Gerhard M. Brauer, Peter Carr, Sze-Foo Chien, Mrs. Wesley J. Dale, Dow Chemical Company, John Ellis, Linda Ellis, Douglas E. Fjare, Kristi A. Fjare, General Electric, Don D. Gilbert, Jerry A. Herby, Honeywell Corporation, Herbert A. Laitinen, Daniel L. Leussing, Avrom I. Medalia, Chiu Po-Yuen, Indulis R. Rutks, Paul A. Sitz, Mrs. Vernon A. Stenger, and Ellen L. Wu.

Transition State

NEW FACULTY

Jan Almlöf accepted a joint appointment in September as a professor in the Department of Chemistry and the Minnesota Supercomputer Institute. Almlöf received his Ph.D. from the University of Uppsala, Sweden, in 1971. From 1971 to 1976 he worked with Professor Björn Roos at the University of Stockholm, with an intermission in 1973 for an appointment with the IBM San Jose Research Laboratory. During that period he developed methods and computer programs for utilization of point group symmetry in LCAO calculations.

In 1976, Almlöf accepted a chair in theoretical chemistry at the University of Oslo where he was in charge of research and education within the theoretical chemistry group. His research programs spanned a wide range of activities, from applications of established methods in combination with experimental work, to development of computational methods and pure theoretical work on the foundations of molecular quantum theory. His dominating interest, however, was in computational methods, which included recasting and improving basic theory into forms suited for modern numerical techniques. His current research interests include the development of theories for large-scale computational chemistry and their use with the high speed computers available at the Minnesota Supercomputer Institute.

Almlöf lives in Roseville with his wife, Elisabeth, and their three children, Anders, 13, Maria, 11, and Martin, 8.

FAREWELL

Professor **Jed F. Fisher**, a member of the bioorganic chemistry division, accepted in October 1985 a position at the Upjohn Company in Kalamazoo, Michigan. While here, he made a number of scholarly contributions on the metabolism of anticancer drugs.

Professor **William E. Fristad** left in August 1985 to join the Henkel Corporation in Minneapolis. His research in the department was in organometallic chemistry.

RETIREMENT

Regents' Professor **Bryce L. Crawford, Jr.**, one of the most distinguished colleagues in the history of the Department of Chemistry, retired in June 1985. Crawford was born in New Orleans in 1914, and pursued his higher education at Stanford University, obtaining an A.B. degree in 1934, A.M. in 1935, and Ph.D. in 1937. He was a National Research Fellow at Harvard University from 1937 to 1939, and an instructor of chemistry at Yale in 1939-40. Crawford came to Minnesota as assistant professor in 1940, was promoted to associate professor in 1943, and became professor in 1945. He served as chairman of the Department of Chemistry from 1955 to 1960, and as dean of the Graduate School from 1960 to 1972. In 1982 he was named a regents' professor.

Crawford pioneered in the application of infrared spectroscopy to chemical problems. His profound fundamental understanding, combined with great experimental skill and ingenuity, enabled him to make many outstanding contributions. Over the years, his achievements have received well-deserved recognition. Among his many honors are the Presidential Certificate of Merit in 1945, election to the National Academy of Sciences in 1956, the Minnesota Award in 1968, the Pittsburgh Spectroscopy Award in 1977, the Ellis R. Lippincott Medal in 1978, and the ACS Priestley Medal in 1982. Crawford was a Fulbright Fellow at Oxford in 1951-52 and at Tokyo in 1966-67. He was a Guggenheim Fellow at Caltech and Oxford in 1950-51 and at Minnesota in 1972-73.

Crawford has also been active in the organization of science at the national and international levels. Besides being a member of various scholarly societies, he has held many offices and positions of responsibility. In 1962-63 he was chairman of the Council of Graduate Schools of the United States. From 1964 to 1968 he served on the board of directors of the Association of Midwest Universities, and as president in 1965-66. He was president of the Association of Graduate Schools in 1970. He served the American Chemical Society as a member of the board of directors in 1969-70 and as editor of the *Journal of Physical Chemistry* for 10 years. He was on the Council of the National Academy of Sciences from 1975 to 1978, and in 1979 was made home secretary, an office he still holds.

Crawford and his wife, Ruth, have three children. Their nonscientific pursuits include supporting the Minnesota Twins and making major contributions to Sherlock Holmes scholarship. In the coming years, Crawford will continue to be based in Minnesota as home secretary of the National Academy, so we can continue to enjoy frequent contact with him and to benefit from his wisdom and humor. All his colleagues wish Bryce and Ruth the best.

DEATHS

On January 17, 1986, Professor Emeritus **Gladstone Baring Heisig** lost a long bout with Alzheimer's disease at the age of 93. Those who had the privilege of overlapping with "G.B.," as he was known to all, have memories of a man with strong skills as a teacher and research scholar, and one with the imagination to produce not only stimulating lectures, but texts and manuals that set a standard for analysis and separation procedures.

Heisig was born in 1873 in Houston, Texas. He received a B.A. in 1917 from the University of Texas and an M.A. in 1918 from Rice Institute. He did further graduate work at the University of Minnesota and earned a doctorate at Princeton University in organic chemistry in 1931, working in the laboratories of William Lauder Jones. His background was further enriched through sabbaticals at the University of Rio de Janeiro, Brazil, with the eminent and colorful analytical chemist Fritz Feigl in mineral-inorganic technology and, again, in chromatography at the University of Bristol in England.

Immediately after World War II, he served with the American University at Biarritz, France. Heisig was ahead of his time, not only in his use of audio-video tools in lecture and laboratory development, but politically. He wrote in 1945 to Professor S.C. Lind, the dean of the Institute of Technology, that he thought the army had overstayed its welcome in Europe. Forty years later, some would still agree with him. His work on chemical warfare was recognized by the War Production Board.

His South American sabbatical was associated with sorrow, because Lucille, his first wife, died shortly after their return. Mary, his second wife, and G.B. enjoyed his 1959 retirement with frequent trips, including an African safari. He and Mary were ardent sports fans, missing few football games when it was still possible to enjoy the weather variations of Memorial Stadium.

G.B.'s interest in undergraduate teaching led him to develop the still-used hood and desk designs in Smith Hall. Another of his innovations was a sophomore course for engineers, which he taught for many years at the University. The Heisig family

(Transition to page 5)

Ovations

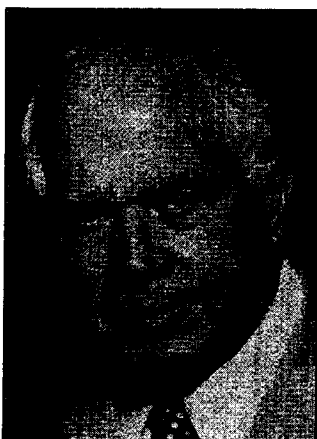
(Transition from page 4)

recently provided a generous fund for undergraduate instruction (see 1984 newsletter). As important as this concrete memorial is, the legacy he left in dedicated teaching, experience, and especially laboratory development will remain with all who have followed.

Heisig is survived by a son, Charles Heisig, New York; a daughter, Doris Terrwilliger, Michigan; a sister, Doris Brown, Texas; eight grandchildren; and four great-grandchildren.

Lorville Lars Anderson, stockroom manager for the department, died July 27, 1985, after a short bout with pancreatic cancer. Andy, as he was known to all, will be sorely missed. He was always helpful and amiable in meeting the needs of students and faculty.

Anderson was born November 30, 1916, in East Chain, Minnesota, where he attended school. In the early 1940s he moved to Worthington. Lorville married Margaret Terry September 20, 1941, in Adrian, Minnesota. During World War II, Anderson served in the U.S. army. He worked for Graff Motors in Worthington until 1969. In 1969, the Andersens moved to St. Paul and Andy began work for the Department of Chemistry. He is survived by his wife, two sons, three brothers, and two sisters.



Lorville "Andy" Anderson

(Spectroscopy from page 2)

Finally, the strength and variety of molecular spectroscopy at the University of Minnesota will be further enhanced when **Doreen Leopold** and **Kenneth Leopold** join the faculty in the fall of 1986. They will start research programs that demonstrate the laser's power and versatility to probe new regimes of chemical phenomena. Doreen Leopold plans to study the electronic structure of isolated gas-phase organometallic species by using a laser to detach electrons from a beam of negative ions. Kenneth Leopold will measure the spectra of weakly bound complexes and free radicals in the difficult-to-reach far-infrared frequency region around $10\text{-}100\text{ cm}^{-1}$ (wavelengths of $10,000\text{-}100,000$ microns) by electronically subtracting the frequency of one infrared laser from that of another.

The Department of Chemistry is proud to be maintaining its traditional strength in molecular spectroscopy, and believes that this field will continue to play a central role in the advancement of fundamental chemical knowledge.

Professor **Robert Brasted** has been elected to a three-year term (1986-88) on the board of directors of the American Chemical Society. He will represent Region V, which includes North and South Dakota, Nebraska, Iowa, Minnesota, Wisconsin, Illinois, Kansas, Oklahoma, and Texas, or approximately 22,000 of the society's 136,000 members. Brasted was also elected as one of four chemists on the Council of the American Association for the Advancement of Science.

Professor **Lawrence E. Conroy** received an award from the Minnesota Science Teacher's Association (MSTA) for outstanding support of science teaching in Minnesota's public schools. The award was given at the annual MSTTA meeting in Minneapolis on October 18, 1985.

Alumnus **John E. Franz**, who received his Ph.D. from the University of Minnesota in 1955 under the direction of Professor Fenton, won the Industrial Research Institute Achievement Award for the discovery of the herbicidal properties of glyphosate, the active ingredient in Roundup herbicide. Glyphosate is the only herbicide that controls, in one application, most annual, biennial, and perennial grassy and broadleaf weeds without sterilizing the soil. Franz joined the Monsanto Organic Chemicals Division directly from Minnesota, and in 1967 transferred to the Agricultural Chemicals Division. He has received numerous awards and worldwide recognition for his publications in the fields of azide chemistry, nitrile sulfide reactions, and 1,3-dipolar additions. He holds 61 U.S. patents, more than 600 foreign patents, and has published 31 scientific papers.

Professor **Paul G. Gassman** has been selected as one of the first recipients of the Arthur C. Cope Scholar Award of the American Chemical Society (ACS). In all, 10 chemists from various disciplines and age categories were so honored. Gassman will receive a personal stipend as well as an unrestricted research grant, and will address the September 1986 ACS meeting in Anaheim, California. He also received a Distinguished Alumni Award from Canisius College, Buffalo, New York, in October 1985.

Professor **Thomas R. Hoyer** was named an Alfred P. Sloan Research Fellow in 1985. The award includes an unrestricted grant-in-aid for research.

Professor Emeritus **I.M. Kolthoff** was the guest of the Royal Society of Great Britain at the meeting of IUPAC in Manchester, England, September 8-13, 1985. The Analytical Division of the Royal Society arranged a dinner in his honor on September 10. They presented him with the prestigious Robert Boyle Gold Medal, the second ever to be given. Kolthoff also received an honorary degree of doctor of science from the University of Arizona at the academic convocation held September 12, 1985.

Professor **Hung-Wen Liu** received a Junior Faculty Research Award from the American Cancer Society effective July 1985. The grant covers his salary for three years.

The Department of Chemistry and Physics at the University of Idaho named their building after **Malcolm M. Renfrew**, Ph.D. 1938, on October 12, 1985.

Alumni Reports

Your response to our request for news last year was most heartening. We received over 75 responses, and an unknown number may have been lost due to our faux pas with the U.S. post office. Thus, "Nonprofit Org. Permit No. 155" only covers bulk mail *leaving* the University. We fielded several angry phone calls from the local office, and in some cases paid postage due. We ask you to use your own stamps in responding this year, in spite of our best intentions to the contrary.

We present the following highlights of alumni reminiscences in alphabetical order by last name. Degrees, adviser, and current position are listed when known. Phone numbers and home addresses can be obtained in most cases through Gladys Olson of our department.

Because of the usual space shortage, some editing was necessary. We apologize for omissions and errors, which are solely the responsibility of the editors.

Harmon B. Abrahamson (B.S. '74) faculty member, Department of Chemistry, North Dakota State University, Fargo.

I received my Ph.D. in inorganic chemistry in 1978 at M.I.T., working with Mark S. Wrighton. I was then hired by the Department of Chemistry, University of Oklahoma, as an assistant professor. I moved to North Dakota State University in fall 1984. My work is primarily in the photochemistry of organometallic compounds. On a personal note, my wife, Julie, is a Ph.D. biochemist, and we have a son, Joel, born August 8, 1985. Joel received an early introduction to science, having attended before he was one month old the fall 1985 series of Abbott lectures.

Kenneth K. Andersen (Ph.D. '59; S. Fenton) professor, University of New Hampshire, Durham.

I am married to Barbara Fowler (University of Minnesota, B.A. '57) and we have three children; the youngest will enter college next fall. I have been a professor of chemistry at the University of New Hampshire since 1960, except for leaves in England, Denmark, and Colorado as a visiting professor.

Kevin W. Arms (B.A. '84)

I have not as yet gotten a job in my field. Since I graduated last summer, I have been traveling, but now I am back in Minnesota to stay.

William J. Bailey (B.A. '43) professor of chemistry, University of Maryland, College Park.

Received the ACS award in applied polymer science for 1986.

Wadim Batorewicz (Ph.D. '67; W. Noland) Uniroyal Chemicals, Middlebury, Connecticut.

John W. Bixler (Ph.D. '63; S. Bruckenstein) Department of Chemistry, SUNY-Brockport, New York.

My wife, two sons, and I spent the 1984-85 academic year in Geelong (Victoria), Australia, where I was on sabbatical leave with Alan Bond at Deakin University. I did some organometallic electrochemistry, continued our collaborative work on nonaqueous ion-selective electrode

potentiometry, and began some ultramicroelectrode voltammetry. Our sightseeing highlights included climbing Ayer's Rock and snorkeling on the Great Barrier Reef while on the way home to SUNY-Brockport.

Frederick G. Bordwell (Ph.D. '41; R. Arnold) professor of chemistry, Northwestern University, Evanston, Illinois.

Received the ACS award in petroleum chemistry for 1986.

David Bowden (B.A. '71) IBM Instruments, San Jose, California.

Larry Brinkman (B.A. '80) senior research chemist, Cargill, Minneapolis.

Jeanette E. Brown (M.S. '58; C. Koelsch) organic medicinal chemist, Merck and Co., Inc., Rahway, New Jersey.

I work on the research team that was responsible for the synthesis of the Cilastatin sodium component of the new antibiotic 'primaxin'. I am active in ACS and was recently elected to my second term as a councilor from the North Jersey Section. I am currently coordinator for the North Jersey Section Metro Women Chemist Committee. I was recently appointed to chair the ACS Committee on Project SEED. I would like to urge University of Minnesota chemistry alumni to help Project SEED, the ACS social action program for disadvantaged high school students, by making a tax deductible contribution, by sponsoring a SEED student in their laboratory, or by becoming an advocate to help obtain a corporate contribution. For more information, contact me at Merck in Rahway or call me at (201) 574-4144.

Melvin Calvin (Ph.D. '35; G. Glockler) professor of chemistry (partly retired), University of California, Berkeley.

So far, I have advised about 150 graduate student theses and have sponsored about 150 postdoctoral students. My group currently numbers three Ph.D. students, four postdoctoral students, and one senior research associate.

[Ed. note: Calvin received the Nobel Prize in Chemistry in 1961 for tracing the stages of carbon metabolism in photosynthesis, the most fundamental of all biochemical reactions.]

Kimberly K. Clark-Ferris (M.S. '84; J. Fisher) 3M, Knoxville, Iowa.

Johannes F. Coetzee (Ph.D. '56; I. Kolthoff) professor of chemistry, University of Pittsburgh.

Received the Outstanding Achievement Award from the University of Minnesota in 1985.

Norman H. Cromwell (Ph.D. '39; W. Lauer)

I just retired as professor of chemistry at the University of Nebraska. During my career I served as chairman of the department, as a research vice president, and later as director of Nebraska's Epley Institute in Omaha.

Stephen F. Darling (M.S. '24; H. Hunter) retired and residing in Appleton, Wisconsin.

After receiving my Ph.D. at Harvard University in 1928, I did research under Ernst Spaeth at the University of Vienna on a Sheldon Traveling

Fellowship. We succeeded in synthesizing capsaicin, the active principle of paprika, and our paper was published in *Berichte* in 1930. After that I became an associate professor of chemistry at the then Lawrence College and head of the chemistry department in 1935; I taught there until 1966. I also was a research associate and teacher at the Institute of Paper Chemistry in Appleton since its beginning in 1930 until I finally severed my connections in 1977. After retiring from Lawrence, I began a research program at the institute with I.A. Pearl on the constituents of the barks and leaves of various species of pulpwood trees, namely aspen and willow. Our research led to publication of 35 papers in the *Journal of Organic Chemistry*, *Phytochemistry*, *TAPPI*, and others. Our next paper will be on the structure of a new sesquiterpene called heterophyllin, which we isolated from southern poplar.

Michael DiPierro (Ph.D. '84; K. Mann) PPG Industries Coating and Resins Division, Allison Park, Pennsylvania.

Postdoctorals at Indiana University-Bloomington and Iowa University.

Mark M. Doherty (Ph.D. '82; P. Gassman) Du Pont Company, Wilmington, Delaware.

Robert A. Eades (Ph.D. '83; D. Dixon) senior research chemist, Physical Chemistry and Surface Science Department, Signal Research Center, Des Plaines, Illinois.

Postdoctoral in Theoretical Chemistry Group, Argonne National Laboratory, 1985.

Robert W. Fennell (M.S. '77; J. Ellis) technical manager, Dayco Corporation, Walterboro, South Carolina.

I miss freshly fallen snow, but not the cold weather found in Minnesota. My family consists of my wife, Wendy, and three daughters—Lisa, 13; Robbyn, 11; and Laura 6.

John E. Franz (Ph.D. '55; S. Fenton) distinguished fellow, Monsanto Agricultural Products Company, St. Louis, Missouri.

Awarded the Industrial Research Institute Achievement Award on October 22, 1985.

Ramachandra Rao Gadde (Ph.D. '73; S. Bruckenstein) Bristol Myers Company, Buffalo, New York.

James Gagnon (M.S. '78; S. Fenton) 3M Environmental Laboratory, St. Paul.

Nicolas L. Galvez (B.A. '25)

After leaving Minnesota, I worked as a chemist for Philippine Sugar Central. Later, I transferred to the University of Philippines at Los Banos, College of Agriculture, Laguna, to teach chemistry, and in 1968 I retired as emeritus professor of soil science.

Robert J. Glinski (Ph.D. '83; D. Dixon) postdoctoral, National Center for Atmospheric Research, Boulder, Colorado.

Will be an assistant professor of chemistry at Tennessee Technological University, Cookeville, beginning September 1986.

Bob Gower (Ph.D. '63; E. Leete) Lyondell Petrochemical Company, Houston, Texas.

I am president of a new operating company formed by Atlantic Richfield. The new company includes our olefins and aromatics products from the chemical area and a larger refinery and associated businesses. Total sales are more than \$3 billion annually, but the operations have been losing money for some time. My assignment is to turn the businesses around.

John A. Haberman (B.A. '69) Atmospheric Experiments Branch, NASA Goddard Space Flight Center, Greenbelt, Maryland.

I received a Ph.D. in physical chemistry in 1975 under the supervision of R.B. Bernstein at the University of Wisconsin, Madison, and held a postdoctoral position with S.H. Bauer at Cornell University. In 1977 I began working for the Laser Physics Branch at the Naval Research Laboratory. In 1980, after one year with the System Sciences Division of Computer Sciences Corporation, I moved to the Atmospheric Experiments Branch at NASA/GSFC. We have recently delivered the Galileo Probe Mass Spectrometer to the project. A May 1986 launch by the space shuttle Atlantis is planned with data returned in late 1988—the first direct sampling data of the atmosphere of Jupiter. [Ed. note: This letter was written pre-January 1986.]

I was married in 1975 and have three children.

Lucille Hac (Ph.D. '35; L. Smith).

I was elected to the Chicago Hall of Fame after retirement.

Gary Hagen (Ph.D. '78; J. Ellis).

I was promoted to senior research chemist at Amoco Chemical Corporation in April 1985.

John C. Halverson (B.A. '50) USDA-FGIS, Grandview, Missouri.

David O. Halvorson (B.A. '55) Du Pont Company, Wilmington, Delaware.

I have worked for Du Pont for 30 years—22 as an R&D chemist and the last eight as an industrial hygienist—and am now an occupational health consultant for several Du Pont petrochemicals department plants. I have two patents and have published two papers, the most recent on "Determination of Benzoic Acid in Air."

Henry A. Havel (Ph.D. '81; A. Moscowitz and J. Overend) Upjohn Company, Kalamazoo, Michigan.

I started working for Upjohn's quality control division in 1981 developing analytical methods for new drug candidates. After two years I transferred to a position responsible for developing tests on the quality of raw materials and of drug substances that had undergone a process change. I then transferred to a newly formed group that develops all the spectroscopic tests for our division. My work now involves assessment of the quality of protein drug candidates.

Dennis C. Johnson (Ph.D. '67; S. Bruckenstein) professor of chemistry, Iowa State University, Ames.

After a brief postdoctoral appointment at the University of Minnesota, I joined the Depart-

ment of Chemistry at Iowa State University in September 1968 as an instructor. I am now a professor in analytical chemistry. My research emphasizes electrochemistry and electroanalysis, with major interest in the electrocatalysis of anodic reactions involving transfer of oxygen from water to the reaction product.

Significant research results include development of triple-step voltammetry at platinum and gold electrodes for detecting all alcohols, carbohydrates, amines, amino acids, and virtually all inorganic and organic sulfur compounds at the subnanogram level. Application of this technique is for detection in liquid chromatography. Research is in progress for development of inexpensive mixed-oxide electrode materials for large-scale oxidations involving oxygen transfer. These will have significance for electrosynthesis, electrochemical energy storage, and electrochemical incineration of toxic and mutagenic compounds.

Kenneth E. Johnson (Ph.D. '77; S. Lipsky) IBM, Rochester, Minnesota.

In September 1977 I left Minnesota for a postdoctoral appointment studying laser-induced fluorescence at the University of Chicago with Don Levy. A year later I started working at IBM's development labs in Rochester. I've just completed my seventh year there having been involved in magnetic recording technology—specifically in the field of rigid recording media. The field has been an interesting study in that magnetic recording encompasses a multibillion dollar industry with plenty of scientific and technological challenges.

Edward P. Kirven (Ph.D. '76; E. Leete) associate professor and chairman, Department of Chemistry, University of the South, Sewanee, Tennessee.

Bruce Kloster (B.A. '74) physician, SUNY-Upstate Medical Center, Syracuse, New York.

S.H. Koo (M.S. '65; E. Leete) Syarikat Sailcos Sdn Bhd, Selangor, Malaysia.

William C. Kuryla (Ph.D. '60; W. Noland) director, Product Safety and Risk Assessment—Consumer Industrial Products and Services Group, Union Carbide Company, Danbury, Connecticut.

I just passed my 25th anniversary with Union Carbide.

Kenneth Kustin (Ph.D. '59; P. O'Connor) on a year's leave as a program director, National Science Foundation.

Lawrence L. Landucci (Ph.D. '67; W. Noland) U.S. Forest Products Laboratory, Madison, Wisconsin.

I am currently in the pulping and wood polymer chemistry group at the U.S. Forest Products Lab. Since 1981 I have been involved in applying modern NMR methods to wood science problems, particularly in characterizing the lignin molecule—one of wood's major components. In August 1985 I organized and conducted the first international workshop, "NMR and Wood Science," held in Vancouver, British Columbia.

In our country home in Verona, Wisconsin, my wife, Jackie, and I are quite busy keeping up with our children (Bill, 16; Gina, 14; Lou, 12). They all enjoy music and each can play at least two instruments. In fact, with all this musical activity around me I became interested and I am enrolled in an evening keyboard course. Bill and I are also very much into computer science and spend many hours collaborating on various software and hardware projects. This, along with my hobbies of electronics and woodworking, keep me very busy.

Francis C. Lanning (Ph.D. '36; S. Lind).

Although I have been retired from Kansas State University seven years, I am still active in research work and recently published a paper entitled "Silica and Ash in Tissues of Some Plants Growing in the Coastal Area of Mississippi, USA" in *Ann. Botany* 56, 157-172 (1985).

William W. Lee (Ph.D. '52; R. Arnold) SRI International, Menlo Park, California.

After Minnesota I joined Monsanto's Central Research Lab at Dayton, Ohio. Two years later I moved to California and joined the staff of Stanford Research Institute at Menlo Park, California, where I have been for 31 years. The institute is now called SRI International. Cancer drugs have occupied the major portion of my research career. For the last several years, I have been concentrating on radiosensitizers, drugs that make the radiation therapy of cancer more effective. I still go out for some volleyball at noon—the net seems to get higher every year!

David J. Lehmick (Ph.D. '45; I. Kolthoff) retired in 1978 from Firestone Central Research, Akron, Ohio.

Thomas M. Lenich (B.A. '64) Pickands Mather Service, Inc., Hoyt Lakes, Minnesota.

Harold V. Lindstrom (Ph.D. '40; W. Sandstrom).

Currently retired and living in Washington, D.C. Worked at E.R. Squibb and Sons, 1946-52; at Rutgers University as a research associate, 1952-57; and at the Food and Drug Administration, Washington, D.C., 1957-74.

Kathryn Loseth (M.S. '68; W. Parham) animal science, College of Veterinary Medicine, University of Minnesota, St. Paul.

Clinton MacMullen (Ph.D. '35; L. Smith).

Died in October 1983 after a long, hard struggle with cancer.

Bruce Mattson (Ph.D. '77; L. Pignolet) associate professor, Creighton University, Omaha, Nebraska.

Postdoctoral with W.A.G. Graham, University of Alberta, 1979-80.

Leroy C. McClelland (B.A. '36).

Now living in Lake Mary, Florida; retired in 1976 from Wilson Foods Company, Oklahoma City.

Donald S. McClure (B.A. '42) professor of chemistry, Princeton University, Princeton, New Jersey.

I received my Ph.D. from the University of
(*Alumni to page 8*)

(Alumni from page 7)

California, Berkeley. At Princeton I have an active research group in spectroscopy of molecules and crystals, based on the use of lasers. It's such fun to play with these expensive new toys that I have no intention of retiring and will have to be dragged out, kicking and screaming. Princeton is a nice place to live, and my family (three children) and I have enjoyed it for over 18 years. I've been back to the U of M several times for meetings, etc., and noted that it is bigger every time, and better too. For me it was a great place to start.

Wilfred H. Nelson (Ph.D. '63; S. Tobias) professor of chemistry, University of Rhode Island, Kingston.

I have been at the University of Rhode Island since 1977. Present research emphasis is in the rapid detection and characterization of microorganisms, optical properties, and the chemistry of organotin compounds. I have edited a monograph this year entitled "Instrumental Methods for Rapid Microbiological Analysis," published by VCH Publishers, Deerfield Beach, Florida.

Dean L. Olson (B.A. '79).

I received my M.S. in 1983 from the University of North Carolina. I am currently working on my Ph.D.

Rudolph Pariser (Ph.D. '50; R. Livingston) Du Pont Company, Wilmington, Delaware.

Sheri L. Haines Peterson (M.S. '83, R. Bryant) General Mills, Golden Valley, Minnesota.

I work as an analytical chemist in quality control and regulatory services, and am in charge of all nitrogen related analyses and method development work.

Richard W. Ramette (Ph.D. '54; E. Sandell) professor, Carleton College, Northfield, Minnesota.

Anton F. Rausell (B.A. '55).

Retired and living in Rio Rancho, New Mexico.

Malcolm Renfrew (Ph.D. '38; G. Glockler).

I was just selected winner of the Mosher Award of the Santa Clara Section of ACS. It is my dim recollection that Bob Brasted was an earlier winner. [Ed. note: True, Brasted's year was 1981.]

Harold I. Reynolds (B.A. '50) Standard Register Company, Dayton, Ohio.

I am manager of carbonless manufacturing technology. In 1977 I was elected a full member of Sigma Xi.

Duane R. Romer (B.S. '84) Department of Chemistry, University of Utah, Salt Lake City.

Kenneth D. Rose (Ph.D. '79; R. Bryant) Esso Research Centre, Oxon, England.

I expect to be completing my rotational assignment here in England in December 1985. At that time, I will return to my home in Clinton, New Jersey, and expect to work at the Annandale, New Jersey, site of Exxon Research and Engineering Company.

Robert W. Sandelin (Ph.D. '41; G. Montillon).

Retired and living in Birmingham, Alabama.

Richard F. Sauers (Ph.D. '69; R. Dodson) AgChem Center, Du Pont Experimental Sta-

tion, Wilmington, Delaware.

I'm working in the Agricultural Chemicals Department, R&D Division, at Du Pont. Although my current assignment is in process development research, I've spent 10 years in the product discovery (synthesis) section.

Contrary to what Ed Leete may believe, organic chemists can have boys! I have four boys ages 7, 9, 15, and 18!

Lt. Curt Schmidt (B.S. '79) acquisition project officer, F-16 budget group.

Before assuming my present job, I was an environmental chemist for Erie Mining Company, Hoyt Lakes, Minnesota. I married Cindy in 1979; our children are Laura, 4, and Matthew, 18 months.

Jerald R. Schweiger (M.S. '68; S. Spees) marketing representative, Chemicals and Pigments, Du Pont Company, Wilmington, Delaware.

After receiving my M.S. degree from the U of M (and trying out for the Minnesota Vikings and Miami Dolphins), I attended the University of Texas, Austin, and received my Ph.D. in inorganic chemistry in 1972. After a one-year postdoctoral, I went with the Du Pont Company, Wilmington, Delaware, as a research chemist. Two years later I had the opportunity to get into marketing.

Long-lasting relationships were developed at the U of M—Paul Nolan (M.S. '68) and Ludwig Mayer (Ph.D. '69) with their unique adviser, Dr. Brasted, who was and still is a gem of a person to have been acquainted with.

Gregory W. Schwing (Ph.D. '72; R. Borch) Du Pont Company, Wilmington, Delaware.

After leaving Rick Borch's group in 1972, I joined the achem synthesis section at Du Pont. After four years at the bench, I took an assignment in competitive products and product licensing. In 1978 I became research supervisor of the herbicides synthesis group where we conducted the early synthesis and development of the sulfonylurea herbicides, the most potent class of commercial herbicides ever discovered. In 1982 I was transferred to our marketing division as product manager with world-wide responsibility for fungicide products. After completing the marketing assignment, I returned to research in 1984 where I supervise a formulations development group responsible for developing convenient water-dispersible formulations of our cereal herbicides and our fungicide products.

My wife, Rita, and our children (Hilaire, 18; John, 15; and Bob, 11) live in southeastern Pennsylvania, near the starting point of the Mason-Dixon line. Rita worked for several years doing advertising layout and design for a local newspaper and then as an office manager for a social services agency in Delaware, but she now spends her time active in the little league baseball organization and as president of the PTA. Hilaire is attending college this year at Indiana University of Pennsylvania. On weekends we enjoy visiting our cabin in the Allegheny Mountains in north-central Pennsylvania.

Lowell R. Smith (Ph.D. '60; W. Noland) Monsanto Company, St. Louis, Missouri.

Roger W. Strassburg (Ph.D. '50; W. Parham).
I retired from the B.F. Goodrich Company in

February 1982, and since September 1982 I have been a member of the part-time faculty at the University of Akron.

Marlys Rieke Sutton (B.A. '35) Blountsville, Alabama.

I am author of a book, *Alabama's Blount County Physicians*.

Donald R. Theissen (B.A. '58; W. Parham) general manager, Structural Products Department, 3M St. Paul.

Peter Trumper (Ph.D. '84; T. Hoyer) assistant professor, Bowdoin College, Brunswick, Maine.

Before going to Bowdoin College I did an NIH postdoctoral fellowship at the University of Pennsylvania.

Pui Tsui (M.S. '78; R. Dodson) Forensic Division, Government Laboratory, Wanchai, Hong Kong.

Dale M. Ullevig (Ph.D. '83; J. Evans) IBM Corporation, Boulder, Colorado.

Harry M. Walker (Ph.D. '49; C. Koelsch).

I have recently retired after 36 years with Monsanto Company and have entered the air pollution consulting field as H.M. Walker and Associates. Our consulting emphasis will center on ozone/atmospheric chemistry and on dispersion modeling. I remain active in mountain climbing, whitewater canoeing, and spelunking (caving). I am still working on a goal of climbing all of the 14,000-footers in Colorado, but still have quite a few to go. I have four grown children and five grandchildren with my wife of 40 years, Dorothy.

Stanley Wawzonek (Ph.D. '39; C. Koelsch) professor emeritus, chemistry department, University of Iowa, Iowa City.

I have a patent on a method for reducing HCHD levels in polymeric compositions. I was chairman of the chemistry department of the University of Iowa.

Paul F. Wiley (Ph.D. '44; L. Smith) distinguished scientist, Upjohn Company, Kalamazoo, Michigan.

I am in my 25th year working for the Upjohn Company on the chemistry of antibiotics, and am nearing retirement. My position as distinguished scientist is the highest rung in the parallel ladder for people remaining in research.

Lee R. Zehner (Ph.D. '73; S. Fenton) Biospherics, Inc., Rockville, Maryland.

In my new position, I am leading a group responsible for development of a new noncaloric sweetener, called Lev-O-Cal. Lev-O-Cal is based on the concept of L-sugars, which, as a result of being mirror images of the naturally occurring D-sugars, are equally as sweet, yet much lower in caloric content than D-sugars.

Eric Zilley (M.S. '81; R. Borch) 3M, Maplewood, Minnesota.

Patrick G. Zimmerman (Ph.D. '84; W. Farneth) 3M, St. Paul.

Chemistry Students Recognized

The Department of Chemistry would like to announce the 1985 award recipients.

Undergraduate chemistry majors received the following awards: **Heidi Berven** and **Eric Svensson**—G.B. Heisig Research Fellowship and Prize for outstanding achievement in undergraduate research and for overall scholastic excellence; **Clair J. Emery**—CRC Freshman Chemistry Achievement Award; **Robert Szalapski**—Merck Index Award, Inc., for outstanding scholastic achievement in organic chemistry; **Susan Green**—Undergraduate Award in Analytical Chemistry sponsored by the Division of Analytical Chemistry of the American Chemical Society; **Kimberly R. Brinson**—J. Lewis Maynard Memorial Prize for outstanding scholastic achievement in advanced inorganic chemistry; **Eileen M. Reardon**—Walter M. Lauer Prize for outstanding achievement in advanced organic chemistry.

The outstanding teaching assistant for 1985 is **Bruce Alexander**, an inorganic chemist. The recipient is chosen by a committee of graduate students from each specialty area, based on nominations from undergraduate students and faculty.

John Bullock, a first-year graduate student in analytical chemistry, was awarded the first Kolthoff Fellowship for outstanding scholarship (see photo on back page).

Graduate students **Margaret Blohm**, **Sandra Mueller**, **Richard Riehle**, **Kevin Roessalet**, **Daniel Singleton**, and **Susan Tucker** hold National Science Foundation Fellowships.

The following students received academic year corporate fellowships: **Paul Boyle**—Du Pont; **Matthew Callstrom**—General Electric; **Andy Ernst**—Procter & Gamble; **Michael Kahlow**—Dow; **Beatrice Kelsey**—Amoco; **Russell Morris**—Henkel; **Martin Rigney**—Dow; **Gary Rodman**—Monsanto; and **Suellen Schulthesz**—3M.

We Thank You

Every year some of the department's functions, such as student fellowships and laboratory establishment for new faculty, are supported by generous contributions from our friends in the industrial sector. They are:

Air Products, American Cyanamid, Amoco, ARCO, Atlantic Council of Chemical Research, Dow, H.B. Fuller, General Electric, General Mills, Eli Lilly, Monsanto, Procter & Gamble, Raychem, Rohm & Haas, Shell, SOHIO, 3M, and Union Carbide.

We also thank the following alumni and friends for their recent help and support.

Ann L. Abeles, Fred B. Abeles, Paul J. Axt, John A. Bohn, Thomas D. Bouman, Charles W. Britzius, Jeffrey W. Butterbaugh, Ruth Crawford, Charlotte R. Drenckhahn, Barbara L. Edgar, John A. Edgar, April Evans, Carl A. Evans, Jr., William F. Filbert, Robert W. Freerksen, Norman W. Gill, William B. Gleason, Bob G. Gower, William H. Gumprecht, Cyrus O. Guss, Charles M. Hall, David A. Halsrud, Maxine L. Heinitz, Henry V. Isaacson, Herbert M. Juneau, Kathleen N. Juneau, Lawrence L. Landucci, Steven E. Lindberg, Robert W. Lindquist, Leo J. Maheu, Blaine C. McKusick, Jerry K. Miller, James A. O'Rourke, Malcolm M. Renfrew, Donald N. Robinson, Mark A. Rustad, Adeline W. Siegel, Thomas G. Stavros, Lynn A. Swanson, Steven J. Tinker, James J. Wade, and Roland D. Wardell.

Honors Program Introduced

The Institute of Technology introduced an experimental honors program for its best freshmen in 1985. Students in lower division honors take an integrated program, which is taught by some of the best faculty in each department. The Department of Chemistry has developed a two-quarter introductory course for IT honors students. The chemistry course integrates with honors math and physics courses, and therefore covers the traditional introductory material in a more mathematically sophisticated way. It also emphasizes applications of chemistry in engineering and materials science. The course's laboratory components differ radically from traditional introductory courses. They emphasize modern spectroscopy (NMR, FT-IR, UV-Vis) and use of microcomputers.

An upper division honors program for junior and senior IT students is being developed as well. Students can enter this program, which will lead to *cum laude* and *summa cum laude* degrees, without participating in the lower division program.

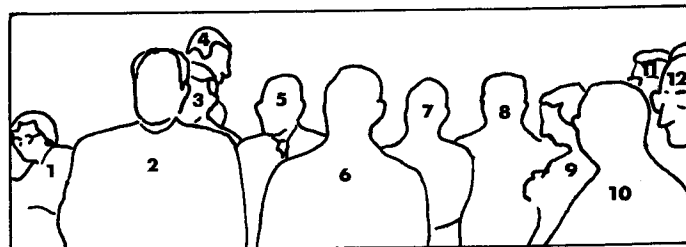
ARCO Challenge Grant

Bob Gower (Ph.D. '63; adviser: Professor **Ed Leete**) set up a matching grant program of \$50,000 with the ARCO (Atlantic Richfield Company) Foundation of Los Angeles, California, to encourage and reward alumni support at the University. The first \$25,000 installment was awarded to the chemistry department for junior faculty support; an additional \$25,000 was awarded to chemistry when the money was matched two-for-one by new alumni donors. The grant money was distributed in \$10,000 amounts to five junior faculty members.

According to Chairman **Larry Miller**, "The grants are important because they allow our junior faculty members to get their research programs started in a proper way. There are a lot of demands on junior faculty to put together first-class research programs, to be good teachers, and to take care of their collegial duties within the University. This kind of unrestricted research support allows them to do things they wouldn't otherwise be able to do."

Each of the faculty members (**Paul Barbara**, **Peggy Etter**, **Wayne Gladfelter**, **Tim Lodge**, and **Kent Mann**) is working on problems in materials chemistry, and therein lies the second reason for the importance of this grant. "Our goal is to use the money not only to get these junior faculty members started in the proper way, but also to try to generate some sense of community in materials chemistry," says Miller.

With total outlays of \$36 million in 1984, the ARCO Foundation is the largest corporate foundation in the United States, providing funding in six different areas, the largest of which is aid to education.



1. Sue Saettler, 2. Bryce Crawford, 3. Wayland Noland, 4. Doyle Britton, 5. Walter Lauer, 6. G.B. Heisig, 7. Steve Prager, 8. Rufus Lumry, 9. Gladys Olson, 10. Lloyd Reyerson, 11. Paul O'Connor, 12. Otto Johnson

Kolthoff Update

The following article, entitled "Kolthoff Does Not Rest on His Laurels" by John Hughes, is taken with permission from the March 14, 1986, issue of the Minnesota Daily.

Some days Izaak Maurits Kolthoff doesn't feel so good. On those days, the 92-year-old retired chemistry professor might ask the University Police to help him get from his Comstock Hall apartment to his Campus Club office.

But he won't take the day off.

"Everyone thinks I have time for this and time for that," he said while sifting through papers in Coffman's fifth-floor Campus Club. "But there are always too many things to do."

A 1943 back operation and an auto accident in his native Holland a few years ago have forced Kolthoff to use a cane, and to hold on to furniture when moving around. But that has not stopped him from his work.

Sitting amid piles of mail and journals, Kolthoff plans experiments and analyzes their results with Miran Chantooni, his lab assistant of 31 years. Chantooni does the lab work, and reports back to his mentor. Their current work is in the area of macrocyclic ligands.

Campus Club workers are used to seeing Kolthoff start his workday at 7 a.m. He usually leaves the club around 7 p.m. In between, he sits quietly in a corner of the club lounge, chatting with Chantooni or waving to Campus Club workers, who he knows by name.

The atmosphere around Kolthoff is as modest as the man himself. His work, though, is anything but modest.

He is best known, internationally, as the father of analytical chemistry. He changed it from an empirical art to a modern science. He made numerous discoveries in the field, and his textbooks are standards in several countries. He is an expert in about a dozen areas of chemistry.

Few laymen understand the significance of Kolthoff's accomplishments. But one discovery seems more down-to-earth—during World War II he formulated the recipe for "cold process" rubber for the government. Since he retired in 1962, Kolthoff has had 133 papers published, bringing his career total to nearly 1,100. He's guided the research of 51 doctoral students, who in turn guided the research of others. His academic "descendants" number 1,073.

Kolthoff Hall is named after him, and its display case is filled with awards from around the world. During the Cold War years, he was given a hero's welcome in the Soviet Union.

Kolthoff is one of two [Department of Chemistry] faculty members in the National Academy of Sciences. He has received the two highest medals of honor from the American Chemical Society and was awarded the Robert Boyle Medal from the Royal Society of Chemistry in England.

To mention a few.

"My major work is done," said Kolthoff, always whistling his S's, "but there is still plenty to do."

Most of his work, Kolthoff said, gets done in the morning. In the afternoon he gets tired. At 1 p.m., Kolthoff's slight frame can be seen near the food line, motioning Campus Club workers that he would like his usual meal of soup, a fruit cup, and piece of pie.

"What keeps him going is his work," said Tim Mulcahy, a Campus Club employee.

And Kolthoff is quick to point out that Chantooni keeps his work going. Not only does he run errands and set up experiments, but Chantooni often acts as Kolthoff's memory.

"That is my trouble. I have a terribly hard time to remember . . . it is irritating," Kolthoff said.

But when he forgets, Kolthoff has learned not to get angry, but to wait.

"It's very strange. Your brain get a message and 15 minutes later you get an answer," he said. "The chemistry of the brain—that's the work I would go into if I was reborn. We know horribly little about the brain."

Kolthoff still laughs about the now-famous story of his beginning in chemistry. When he was 15 his mother made a soup for dinner and mistakenly added sodium carbonate rather than sodium chloride. Kolthoff came to his mother's aid, adding hydrochloric acid to the soup to bring up its pH factor until a strip of blue litmus paper turned pink. The soup turned out fine.

He also laughs about the fact that because he didn't know Latin or Greek he was ordered not to study chemistry at the University of Utrecht in Holland. His degree, then, was in pharmaceutical science.

His first paper, which dealt with titration, the process he used to fix the soup, was published in 1914. In 1927 he was invited to come to the University [of Minnesota] while on a lecture tour.

"Those things," said Kolthoff, "I remember quite well."

Overend Fund

We would like to thank the following people and organizations for their generous gifts to the John Overend Memorial Fund. Our apologies if any names have been overlooked.

Diane L. Anderson, George R. Anderson, Rutherford Aris, Catherine Asimakopoulos, George Barany, Jonathan L. Bass, Henry A. Bent, Mrs. Henry Bent, John H. Birely, James F. Blanke, Alexandria R. Bowen, John R. Breitlow, Penelope Breitlow, Doyle Britton, David G. Cameron, John S. Dahler, Eugenia A. Davis, Howard T. Davis, Dow Chemical Company, David F. Eggers, Gerda A. Gassman, Paul G. Gassman, Gilbert & Sullivan Light Opera, Barbara L. Goldenberg, William G. Golden, Gown-in-Town Club, Jeanette G. Grasselli, Julian Heickler, Susan Heickler, Mrs. Gray Huston, IBM Corporation, J. Vernon Jensen, Ronald O. Kagel, Stanley King, Izaak M. Kolthoff, Lester C. Krogh, Rosa C. Krogh, Mark LaBoda, Dwight C. Legler, Curtis A. Marcott, C. Alden Mead, Edward J. Meehan, Essie K. Miller, Larry L. Miller, Jane Mitchell, Gerald H. Morine, Albert J. Moscovitz, Craig B. Murchison, Laurence A. Nafie, Mary E. Nielsen, Peter A. Nielsen, Alfred H. Nier, Jane B. Parr, Robert G. Parr, Inger Pignolet, Louis H. Pignolet, PQ Corporation, The Procter & Gamble Fund, Donald A. Ramsay, Ellis Remsberg, Judy Remsberg, Deni M. Rose, Joel W. Russell, Kerin Scanlon, James R. Scherer, David M. Schwann, Patricia L. Schwann, SOHIO, Allen Spector, Mildred E. Spector, Standard Oil Company, Jerome D. Swalen, 3M Company, Jane Truhlar, George A. Warp, Florence C. Wertz, John E. Wertz, Shang J. Yao, Richard N. Zare, Karen L. Ziegler, and Richard S. Ziegler.

Recent Department of Chemistry Graduates

This page lists the degrees awarded by the Department of Chemistry from January 1985 through December 1985. Columns are, left to right, name of graduate, degree adviser, thesis, and current place of employment.

Ph.D. Degrees

John A. Bennek	Gray	"Mechanistic, Analytical, and Synthetic Studies of Glycosidic Reductive Cleavage"	Rohm & Haas Spring House, Pa.
Steven R. Flom	Barbara	"The Dynamics of Electronically Excited Molecules in Solution"	Postdoctoral, Chem. Dept., Univ. of Syracuse, Syracuse, N.Y.
Richard J. Kvitek	Evans	"Studies of Immobilized Diaminesilane: Preparation, Surface Characterization and Reaction of the Bound Ligand with Aqueous Copper (II)"	IBM East Fishkill, N.Y.
Amy M. McNair	Mann	"Investigations of Ruthenium and Osmium Arene Complexes"	Hercules Research Center Wilmington, Del.
Robert J. McNair	Pignolet	"Synthesis, Characterization, and Reactivity of Ruthenium Phosphine and Rhodium Heterobimetallic P-N-P Complexes"	John Matthey, Inc. West Deptford, N.J.
Marlene M. Mixa	Mann	"The Synthesis, Characterization, and Study of Tetranuclear Linear Metal Chain Complexes Based on Tetrakis (Diisocyanide) Rhodium Dimers"	Westvaco Laurel, Md.
Ann M. Muetting	Pignolet	"Synthesis, Characterization, and Reactivity of Rhodium and Iridium Phosphine Complexes Containing Sulfur Ligands Resulting from Reactions with H ₂ S"	Asst. Professor, Chem. Dept., Drake Univ., Des Moines, Iowa
Drazen Ostovic	Kreevoy	"Hydride Transfer Between NAD ⁺ Analogues"	Postdoctoral, Chem. Dept., Univ. of California, Santa Barbara, Calif.
Janet L. Schrenk	Mann	"Photochemical Arene Replacement Reactions of η^5 -Cyclopentadienyl Iron (II) η^6 -Arene Cations"	Art Conservation Program, Univ. of Delaware, Newark, N.J.
David W. Schwenke	Truhlar	"Interaction Potentials and Quantum Mechanical Dynamics Calculations for Electron, Atom, and Molecule Scattering"	Postdoctoral, Chem. Dept., Univ. of Minnesota, Minneapolis, Minn.
Andrew J. Strandjord	Barbara	"Excited State Dynamics of 3-Hydroxyflavone"	Dow Chemical Midland, Mich.
Joseph C. Suhadolnik	Hoye	"Epoxy Cascade Approach to Uvaricin"	Postdoctoral, Chem. Dept., Rensselaer Polytechnic Inst., Troy, N.Y.
Peter K. Trumper	Hoye	"Synthesis Toward Venturicidin"	Asst. Professor, Chem. Dept., Bowdoin College, Brunswick, Maine
Wendy S. Trumper	Hoye	"Total Synthesis of Sarracenin and Preliminary Investigations Directed Toward Sesbanimide"	Du Pont Wilmington, Del.
Garry F. Warnock	Ellis	"Synthesis and Chemistry of Carbonylmetallate Trianions of Vanadium, Niobium, Tantalum, Manganese, Rhenium, Cobalt and Iridium"	Postdoctoral, Research School of Chem., Australian Natl. Univ., Canberra, New South Wales, Australia

M.S. Degrees

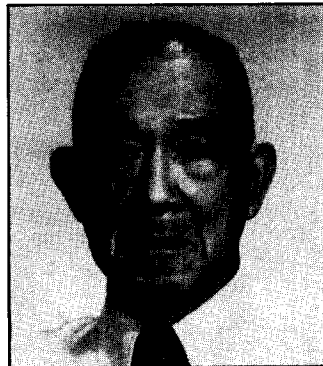
Angela M. Buehler	Pignolet	"Synthesis, Characterization, and Reactivity of Some Mixed-Metal Rh and Au Complexes Containing Primarily Phosphine and Phosphate as Ligands"	3M St. Paul, Minn.
Barbara A. Bullis	Borch/Gray	"Polysaccharide-Protein Conjugates as Prophylactic Vaccines for <i>Streptococcus pneumoniae</i> "	3306 Richmond Ave. St. Paul, Minn.
Jane M. Chatterjee	Brasted	"The Application of Learning Theory to the Teaching of Chemistry at the American High School and Beginning College Levels"	Conroy Associates, c/o Distron Miami, Fla.
Nancy F. Cole	Ellis	"Reactions of the Dihydrodioctacarbonyldimetallate Dianions of Molybdenum and Tungsten"	Radian Triangle Park, N.C.
William F. Cooper	Lipsky	"The Effect of Perfluorocarbons on the Photochemical Production and Decay of Wurster's Blue (N,N,N',N' Tetramethyl-P-Phenylenediamine Cation) in 2,2,4 Trimethyl Pentane"	Chem. Dept., North Dakota State Univ., Fargo, N.D.
Cheri W. Fink	Stankovich	"The Oxidation-Reduction Potentials of Butyryl CoA Dehydrogenase"	3107-14th Ave. S. Minneapolis, Minn.
James H. Gibson	Evans	"Effect of Oxygen Functionalities in the Plasma Etching of Polymers with Hydrogen Containing Gases"	SOHIO Research Center Cleveland, Ohio
Pamela A. Matsch	Mann	"The Electrochemistry of Diphosphine, Diisocyanide Rhodium(I) Dinuclear Complexes"	TA, Chem. Dept., Univ. of Minnesota, Minneapolis, Minn.
Charles R. Ojala	Gougoutas	"Crystallographic Aspects of Some Isosteric Molecules"	Rochelle Crystal Corp. St. Paul, Minn.
Andrew C.R. Pipino	Hexter	"The Effect of Surface Morphology on SERS: Evidence for the Electromagnetic Model"	Cardinal IG Minneapolis, Minn.
Anna O. Yusun	Stankovich	"The Electron Transferring Flavoprotein from <i>Megasphaera Elsdenii</i> "	Instructor, Chem. Dept., College of St. Thomas, St. Paul, Minn.

The following people, listed in alphabetical order, received bachelor's degrees with a major in chemistry during the calendar year 1985.

Scott D. Beede, Erik J. Bergum, Heidi M. Berven, John A. Blackwell, Bruce A. Bohnen, Todd C. Brejle, Kimberly R. Brinson, Mark W. Dahl, Tho Q. Dinh, DeAnn J. Drott, Mohamed A. Elmasry, Susan M. Ernst, Richard J. Ettinger, Sabiha A. Gokcen, Susan A. Green, Dallas W. Hallberg, Nathan J. Harris, John E. Hill, William K. Johnson, Ha M. La, Kyle J. Lindstrom, John O. Link, Robert S. Noyes, Esther P. Oettli, Constantine S. Papageorgiou, Steven W. Peterson, Lisa A. Rogers, David P. Ruschke, Gerald K. Schynoll, Franc Strgar, James D. Teresi, Michael D. Timm, Karen M. Torvi, Wendy N. Troczynski, and Paul C. Vosejka.



John Bullock (center) receives the first Kolthoff Fellowship check from the benefactor (I.M. Kolthoff, left) and Chairman Larry Miller.



Nicolas L. Galvez, B.A. 1925, sent us this recent photo. Alumni Reports begin on page 6, and are a key feature of this issue.

Crawford Feted

A Symposium on National Science Policy was held to honor **Bryce Crawford's** activities as a researcher, teacher, administrator, and home secretary of the National Academy of Sciences (see "Transition State," page 4) on October 25, 1985, at the University of Minnesota. Guest speakers were **Ettore Infante**, dean, Institute of Technology; **Frank Press**, president, National Academy of Sciences; **Mary L. Good**, president, Signal Research Center; and **George C. Pimentel**, professor of chemistry, University of California-Berkeley. The symposium was attended by about 100 people.

Smith Hall Renovation Continues

Phase I of the Smith Hall renovation project is scheduled for completion in the summer of 1986. At that time those who vacated the south half of Smith Hall will return from their temporary quarters in Appleby Hall to Kolthoff Hall. Those who stayed on the north side, while 100 or so workers of all kinds beat on this old hall, worked under trying conditions of noise, dust, and foul odors. They will move to Appleby Hall and Kolthoff Hall during phase II. When it is all over, Smith Hall will have new innards—all new plumbing, a new electrical system, and a new heating and air-conditioning system. Most of the laboratories will have been redone completely. All services will have been replaced. If the budget will tolerate it, there will also be new office and laboratory furniture with provisions for microprocessor terminals. The long wait should be worth it.

This issue was prepared with the assistance of University Relations.

The University of Minnesota is an equal opportunity educator and employer.

Minnesota Chemists Newsletter
c/o Gladys Olson
Department of Chemistry
115 Appleby Hall
128 Pleasant Street S.E.
University of Minnesota
Minneapolis, MN 55455

NONPROFIT ORG.
U.S. POSTAGE
PAID
PERMIT NO. 155
MINNEAPOLIS, MN.

Address Correction Requested