



Charles Walton: Hands-on Benefactor To Chemistry At The U. of I.

On the journey from their winter home in Sugarloaf Shores, Florida, to their summer home in Dillon, Montana, Dr. and Mrs. Walton stopped by to see what his latest seed money grant had sprouted. The visit with Professor Andrew Gellman, his most recent beneficiary, showed remarkable results. With Dr. Walton's financial help, the lab is rapidly filling with equipment that Professor Gellman has been designing for the past year. Professor Gellman has already received an award from the Dreyfus Foundation of New York for Distinguished New Faculty and outside research support is materialising.

Dr. Walton was clearly pleased with the latest project that has had his support. He has had a great deal of experience with developing talented young people. One of the reasons that he came to see for himself is that, as he says, "I can judge research better by meeting the researcher than by reading all his papers".

Other Projects At The U. of I.

Helping to equip Professor Gellman's lab is one in a series of projects Dr. Walton has undertaken at the U. of I. Although he leaves detailed decisions about spending with the head of the department, he asks to be informed on the types of projects that chemistry is considering and is fully informed on the results of his largesse.

One of Dr. Walton's earlier projects had been to help Professor Herbert S. Gutowsky establish a new research program after the latter had completed his term as head of the Chemistry Department and Director of the School of Chemical Sciences. Since Professor Gutowsky was undertaking research in a new field, he needed seed money in order to establish



Dr. Walton visiting Professor Gellman's research laboratory.

the program and to obtain outside funds. With Dr. Walton's financial support, the Gutowsky program has grown into a research group. A number of high quality research papers have resulted and both governmental and industrial support have been attracted.

Dr. Walton's next project has already been selected. He will be helping to equip a laboratory for Dr. Scott Kahn, who is coming to Illinois this summer. Dr. Kahn is a computationally oriented organic chemist, who is interested in predicting complicated reactivity patterns and structure related matters. Dr. Kahn is a young chemist of enormous potential who has been attracted to the U. of I. not only by its excellent supercomputing facilities but also by the offer of initial research support, supplied, in part, by Dr. Walton, to help him build a state-of-the-art laboratory to carry out his work.

He Fosters Young Talent And Good Programs

Besides fishing and hunting, Dr. Walton particularly enjoys being involved with the development of young talent and good projects. He has had a great deal of experience in these matters, both from his work at the Goodyear Tire and Rubber Co. from 1933-47, and from his work at the 3M Co. from 1947 until his retirement in 1969.

After five years of research on synthetic rubber at Goodyear, Walton became the company-wide "Technical Coordinator" for all synthetic rubber activities during World War II. Subsequently, he organized and staffed a new laboratory to conduct product development work on adhesives, chemicals, plastic films and foam rubber.

At 3M, Walton rose from General Manager of the New Products Division, which he created and staffed and which became a "greenhouse for growing new businesses". From there he was promoted to Vice President and General Manager of the Adhesives, Coatings and Sealers Division, then to Vice President of Corporate Research and Development, and finally was made a Director of the Company.

In 1967, Walton was the recipient of the "Honor Award" of the Commercial Chemical Development Association, Inc., a national organization devoted to innovation and entrepreneurship. His Award read as follows, "In recognition of his outstanding contributions in the field of commercial chemical development, by virtue of which new business enterprises have been created based on successful research and development in fluorochemicals, thermoprinting, and low density adhesives".

Walton was early to recognize the advantages of a "multi-disciplinary" and "team approach" to problem solving, both in the research and development laboratory, and in the creation of new products and new businesses. He assembled teams of capable people with diverse technical and business backgrounds, and gave them an unusual amount of freedom and autonomy. In this atmosphere, people could have "fun in their work" which brought out the best in them—made them most creative and productive. Team goals were mission oriented but team players were taught to remain observant and aware that "unexpected results" can often be more important than those anticipated. 3M's development of stain-resistant fluorochemicals stemmed from just such serendipitous observations.

Throughout his corporate career Walton invested his time and energy in the training of talented young people and

put "seed money" into long-term research programs where the pay-off might be years away, if ever, but where the potential return outweighed the risks. His efforts have paid off. Among the people he trained, three are now Vice Presidents of the Company. These include Dr. Robert Adams who received his Ph.D. in Chemical Engineering from the U. of I. in 1950. Dr. Adams won the Earle B. Barnes award for Leadership in Chemical Research Management, an award that is given by the American Chemical Society and sponsored by Dow Chemical Company.

His Ties To The Past

Dr. Walton began his undergraduate career at Blackburn College and completed his B.S. at the U. of I. in 1930. He went on to take an M.A. and a Ph.D. (1933) at the University of Michigan because "there were no jobs to be had at that time". In 1965 he received an honorary Doctor of Science degree from Blackburn College.

Though now retired, Dr. Walton takes an active interest in the University of Illinois and other educational institutions, and continues his "seed money" approach, now using his own money. His hands-on philanthropy is consistent with his belief in the search for excellence. He believes that the goal of the University of Illinois is to develop superior young new teaching staff, to train more and better students, and to search for new technical knowledge.

His boundless patience, energy, kindness, and skill in developing people and projects are as much a legacy to the University of Illinois as the seed grants, which have provided the foundation for outstanding scientific work. We hope that he and Mrs. Walton will return often to this Alma Mater to renew friendships and to see the results of his efforts on the University's behalf.

Honors To U. of I. Ex-Staff

Former Postdoc Fellow, Werner Herz, Wins Distinguished Professor Award

Werner Herz, a postdoctoral fellow at the U. of I. from 1947-49, has won Florida State University's highest faculty honor, the 1987 Robert O. Lawton Distinguished Professor Award. Professor Herz is an internationally recognized organic chemist who has done extensive and pioneering research in "the chemical constituents of secondary plant metabolites, particularly in describing the chemical structure of the terpenoids of plants belonging to the family Compositae". The award carries lifetime financial support for research, an honorarium, and permanent retention of the title. Selection is based on major contributions to teaching, research and creative endeavors at Florida State University.

Paul F. Hollenberg, Former Postdoc, Editor of New ACS Journal

Professor Paul F. Hollenberg, a Postdoctoral Fellow at the U. of I. in Biochemistry in 1969-72, and currently Chairman of Pharmacology at Wayne State University School of Medicine, has been appointed associate editor of a new ACS journal called "Research in Toxicology".

This special, oversize issue of the Alumni Newsletter covers both Summer '87 and Winter '88. Thereafter, we will return to our normal schedule and publish the Newsletter twice a year.

Happy Season's Greetings to all our readers and best wishes for the New Year!

HIGHLIGHTS SUMMER '87, WINTER '88

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1986/87 Was A Banner Year

The '87 Graduates

The graduating class of 1987 walked off with three of the nine undergraduate National Science Foundation Fellowships awarded at the University of Illinois. Two of the winners, **Eugene F. Mueller** and **Wesley W. Miyazaki** are biochemists, who are going to Harvard for graduate studies and **Kenneth W. Fishbein** is a physical chemist who will enter MIT in the Fall.

Of the 188 graduates, about 25 were accepted into Bronze Tablet, the highest all university award, given to students who had achieved at least a 4.5 (B+) overall grade point average and ranked in the top 3% of their college's graduating class. This is a singular achievement for students in the chemical sciences who master some of the toughest curricula at the University of Illinois.

About half the graduates are headed for further studies, either in academic or professional fields. Most of the rest are going into industry and the remainder will be entering government service.

As a group, the seniors received such exceptionally good grades that award winners were difficult to select. For instance, the Du Pont Summer Resident Research Program, which usually accepts at most one student, accepted two this year because both were such good candidates. The following seniors were selected by the departments to receive awards:

Alumni Awards to **Michael T. Hyzny** (Chemical Engineering), **Brian C. Davison** (Chemical Engineering), **Karl R. Krause** (Chemical Engineering), **Eugene G. Mueller** (Chemistry), and **Kenneth W. Fishbein** (Chemistry).

American Institute of Chemists Awards to **Stefanie J. Fry** (Biochemistry), **Ruth Ma** (Chemical Engineering), and **John P. Rose** (Chemistry).

The **Eisele Award** was given to **Robert W. Johnston** (Chemical Engineering).

Fuson Awards to **Brian P. Grady** (Chemical Engineering), and **Michele H. Wong** (Chemical Engineering).



Chemistry and Biochemistry undergraduate award winners, with Professor Zumdahl in rear. Winners from left: Kenneth Fishbein, Jonathan Stocker, David Rudnick, Eugene Mueller, and Janet Ruhl.

The **Donald B. Keyes Award** was given to **Dan Coronell** (Chemical Engineering).

Merck Awards to **Cynthia M. Sanders** (Biochemistry), **Steve M. Casey** (Chemical Engineering), and **Janet C. Ruhl** (Chemistry).

NSF Fellowships to **Eugene G. Mueller** (Biochemistry), **Kenneth W. Fishbein** (Chemistry), and **Wesley Y. Miyazaki** (Biochemistry).

Rodebush Awards to **Christopher A. Long** (Chemical Engineering), and **Jonathan W. Stocker** (Chemistry).

Phi Lambda Upsilon/Arthur W. Sloan Prizes to **Wesley Y. Miyazaki** (Biochemistry), and **David A. Rudnick** (Chemistry).

Tom Sidebottom—ROLM Award was given to **Wesley Miyazaki** (Biochemistry).

The Eisele, Fuson, Rodebush, Keyes, Sidebottom, and Alumni Awards were established through generous donations of

alumni and friends. These prizes are very important for maintaining the high quality of the department by rewarding student excellence. In this and other ways alumni support through the years has helped the Chemical Sciences at Illinois maintain the high quality of its programs.



The Graduate Students

In 1986/87 47 Ph.D.s and 11 M.S. degrees were awarded by the School of Chemical Sciences. This is a marked increase over the 35 Ph.D.s of the year before. The future looks even brighter. The School has been able to attract 120 incoming graduate students for the Fall of 1987, some of whom are outstanding candidates, who are also being recruited by other top departments in the country.

Seven graduate students held national fellowships. **Jenny Carerro** entered the Chemistry program with a five year National Institutes of Health Fellowship. Six Chemical Engineering students held fellowships won in national competition. These included **Ofelia Araujo** with a National Steel Fellowship, **Joan Brennecke** with both a National Science Foundation (NSF) and a DuPont Ph.D. Fellowship, **Hariklia Deligianni** with an IBM Fellowship, **James Folta** with a NSF fellowship, **David Klingenberg** with a Hertz Fellowship, and **Helen Yang** with a DuPont Ph.D. fellowship. All other graduate students received School support. Fellowships were an important source of income for almost 70 students. Except for all-university fellowships, the bulk of fellowship support came from industrial sources.

Placement of graduating Ph.D. students was 100%, with the majority going into industrial settings. Even though we like to take credit for the high placement rate, in fact, the outcome is largely determined by market factors. Now that oil companies are again hiring and major chemical firms are taking on more new staff, graduating students are benefiting and morale is high. Professor Nelson J. Leonard's farewell remarks, made to the undergraduate students at the chemistry/biochemistry commencement exercises, were equally applicable to the graduate students. He said, "I wish you good work, good fun, and good fortune as scientists".



Chemical Engineering undergraduate award winners, from left: Michelle Wong, Robert Johnston, Christopher Long, and Brian Grady.





Academic procession, clockwise, starting at back row, left: Professors Zumdahl, Leonard, Jonas, Conrad, Scheeline, Klemperer, Suslick, and Coates.
Ken Brooks

Four New Faculty

Two chemists and two biochemists joined the faculty during the past year. One of the latter, **David Kranz**, has already won a prestigious national award (see below).

The two new chemists are Andrew Gellman and Patricia A. Shapley. Professor **Andrew Gellman** came to Illinois after completing his Ph.D. at the University of California (Berkeley) in 1985, and an ICI Postdoctoral Fellowship at the University of Cambridge in 1985-86. He will be studying the growth and structure of surface compounds such as metal oxides, sulfides, and nitrides to investigate their catalytic properties. In addition, he will do research on the chemical aspects of bonding or adhesion of surfaces and the effects of surface composition on frictional properties.

Professor **Patricia Shapley** received her Ph.D. from MIT in 1981. She spent a year as a postdoctoral fellow at the Institut Louis Pasteur in Strasbourg, France, and three years at the Chicago Circle Campus of the U. of I. before coming to the Urbana Campus to do research in organic and inorganic chemistry. Her research is directed toward the synthesis of organometallic complexes which model intermediates in

oxidation reactions, mechanistic studies of the reactions of these complexes, and the development of selective oxidation reagents and catalysts for organic synthesis.

The two new biochemists are Timothy Karr and David Kranz. Professor **Timothy Karr** received his Ph.D. from the University of California at Santa Barbara in 1981 and was a Research Fellow at the University of California in San Francisco before joining the Biochemistry Department at the University of Illinois. His research focuses on the structure and function of the microtubules in the *Drosophila melanogaster* embryo.

Professor **David Kranz** received his Ph.D. from the University of Illinois in 1982 and completed his postdoctoral training at MIT before returning to his Alma Mater in 1986 to continue his research in immunology.



Faculty Honors

Because of the very large number of honors won by the School's faculty during the past year, this issue of the Alumni Newsletter will include only those items which were reported since the Winter 1987 issue appeared.

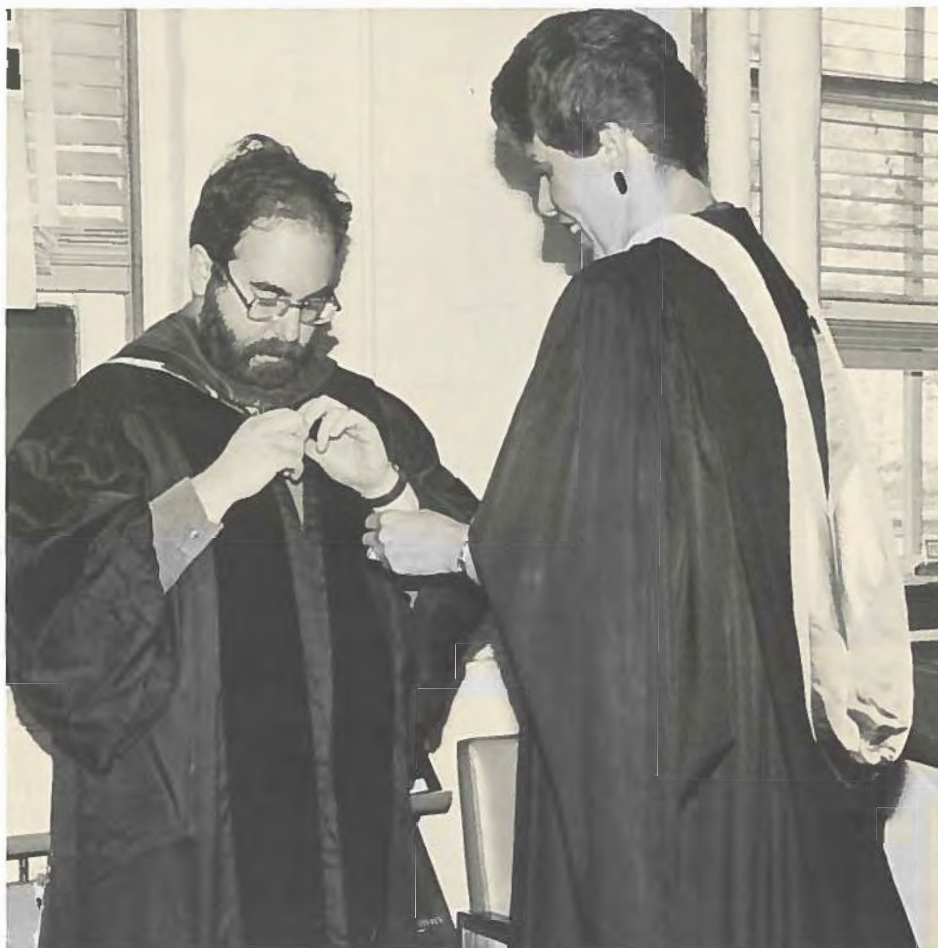
Professor **Harry G. Drickamer** of Chemical Engineering won the Robert A. Welch Award in Chemistry for 1987 "for his discovery of pressure tuning spectroscopy at very high temperatures, which has contributed greatly to the world's understanding of modern science including chemistry, physics, biochemistry, geology, and other disciplines", according to Jack S. Josey, President of the Welch Foundation. The Welch Award, which is presented annually "to an individual who has made important chemical research contributions which have a significant, positive influence on mankind", will be presented at a banquet in Houston with a certificate and a check for \$225,000.

Professor of Chemistry **Jiri Jonas**, Director of the School of Chemical Sciences, was elected Chairman of the National Science Foundation's Advisory Committee on Chemistry and received the honor of being elected a Fellow of the American Academy of Arts and Sciences. The Academy, which is one of the oldest scholarly societies in the United States, founded in 1780 by John Adams and other leaders of the Colonies, includes in its membership scholars in mathematics and the social sciences, the biological sciences, the social arts and sciences, and the humanities.

Professor of Chemistry **Stan Smith** won the 1987 National Catalyst Award of the Chemical Manufacturers Association for his "outstanding contributions to teaching".

Dr. Loretta Jones, Associate Director of the General Chemistry Program, has been named one of only five IBM Consulting Scholars. She will be on leave for the coming year to share her expertise in computer-assisted instruction and educational software development with other campuses across the country.

Professor of Chemistry **Ted Brown**, currently also Director of the Beckman



Institute, has been elected a Fellow of the American Academy for the Advancement of Science.

Professor of Biochemistry **David M. Kranz** has been selected a Searle Scholar for 1987. This prestigious award for researchers in the biological sciences carries a grant of \$180,000 to support his research for a three year period.

Professor of Chemistry **Gary Schuster** has been awarded the Mead Imaging President's Award in recognition of his "continuous and exceptional work in the area of chemistry and imaging systems, which have contributed to our knowledge of photochemistry and expansion of our wavelength sensitivity in the visible light range".

A research grant award of Professor of Chemistry **John A. Katzenellenbogen** has been selected by the National Institutes of Health to receive MERIT status. This status is accorded to

outstanding researchers to expedite renewal of grants with minimal documentation.

Hans Frauenfelder, Professor of Physics, Biophysics, and Chemistry, has received a Senior Scientist Award from the Alexander von Humboldt Foundation.

Paul Lauterbur, Professor of Medical Information Science, Director of Research in Magnetic Resonance Imaging, and Professor of Chemistry, has received a number of honors. On the same day he received word that he had won the National Medal of Science and the Fuggi International Prize for 1987. He has also been named to the Stauffer Lectureship at the University of Southern California and received an honorary D.Sc. from Carnegie-Mellon University. In addition, he has been elected to the Center for Advanced Study at the University of Illinois.

Private Support Fosters Excellence

The margin between a good and an outstanding program is often the outside support received from alumni, friends, and private corporations, which offers a degree of flexibility to the administration and provides recognition for excellence among students and faculty. The School of Chemical Sciences is fortunate to have received this support during the past year and hopes to be able to count on continuing support in the year to come.

Many of the established Foundation accounts include several funds set up to honor outstanding faculty, such as Roger Adams, Carl Shipp Marvel, R.C. Fuson, John Bailar, Nelson J. Leonard, Worth Rodebush, and W.H. Flygare. These funds support outside lecturers and varied activities, as specified when the fund was established. Other funds have been set up as memorials to former students or other relatives, i.e. the Bruno Wojcik and the Tom Sidebottom Awards provide recognition to outstanding undergraduate students.

Some donors specify that funds be used for a specific field of the chemical sciences or for a specific type of expenditure, e.g. equipment, lecture series, grants-in-aid, graduate students fellowships. Discussion with staff determine how the donor's wishes can best be accommodated. Some funds are quite specific. For instance, the Illini Chemists Fund was set up, in part, to publish the Alumni Newsletter.

Other funds are given as unrestricted support and are used in a variety of ways to enhance the departments in the School, for instance, as start up funds for new faculty. Most young faculty initially need departmental support to set up their laboratories (see lead article for some examples) and these funds are essential to recruit outstanding young people and to bridge the lean period before they can obtain their own outside support.

Student fellowships play a comparable role in attracting and keeping good graduate students. The promise of fellowship support is important for recruitment and permits the students to concentrate their energies on their studies after they enter the graduate program. In the past year, about 70 graduate students received fellowship support.

These examples serve to demonstrate the crucial role of private support in maintaining an excellent chemical sciences program at Illinois. In addition to providing funds to make these programs possible, private support is also a clear demonstration of confidence in our programs, which is cherished by faculty and staff alike.

Excellence Needs Your Help

Help us to maintain and expand our programs by supporting Chemical Science Funds, below. *The list does not include Chemical Engineering funds since that department handles its own fund raising and reporting.* Please be as generous as you can and include a matching gift form if your company has such a plan.

Mark the appropriate box and send a check made out to UIF/(fund name). A self-addressed envelope is enclosed for your convenience.

- Roger Adams Fund
- R.C. Fuson Fund
- Carl Shipp Marvel Fund
- Nelson J. Leonard Lectureship Fund
- John Bailar Fund
- Willis Flygare Memorial Fund
- Illini Chemists Fund
- General Fund/Chemistry
- General Fund/Biochemistry
- General Fund/School of Chemical Sciences
- I would like to set up a new fund, details to be discussed.
- Other _____

Your Name _____

Address _____

Phone No. _____

Many Thanks For Your Support!

The Placement Office Outgrows Its Name



The "open door" of the placement office makes it a resource center for a wide variety of student activities for undergraduate and graduate students alike. Originally established 30 years ago to help students find full time employment, the Chemical Sciences placement office under the direction of Becky Simon, continues to schedule interviews, helps with resume preparation, and maintains job directories for student use.

Enter Computers

One of the major differences between the office when it first opened and the office today is the increasing use of computers. Gone are the all-night vigils in the Illini Union and in Noyes Lab hallways, of students waiting to sign up for interviews with recruiters. Gone is the endless, repetitive typing for the "green bulletins" and sign-up sheets. Gone are the endless hours of "pulling resumes" and typing interview schedules.

For the last eight years, candidates have been using PLATO to sign up for interviews, with a system designed by Dr. Karl Wieggers (Ph.D. 1977) and maintained by Professor Stanley Smith. The candidate's data sheet (resume) for

each on-campus interview is generated from a database and a laser printer.

The office staff, Nita Eriksen and Lois Siebold, are still just as busy as ever but the computer has made the production of the Employment Opportunities Bulletin and the Available Alumni Bulletin much easier.

Increasing The Scope

A dozen years ago, the placement office added undergraduate advising to its wide-ranging responsibilities. Assigning advisors, orchestrating advance enrollment, advising students, talking with freshmen and with new transfer students are only part of the activities that came with the new responsibilities.

Information on faculty for choosing senior thesis advisors, on graduate programs, on summer jobs or internships, and on scholarships and awards can also be found in the office. One of the most recently added responsibilities is to organize the combined commencement ceremony for chemistry and biochemistry.

The Growing "Co-op" Program

The Cooperative Education Program gives students an option to extend their studies one academic year by spending a limited number of semesters in an industrial setting. These pre-professional positions are carefully supervised to provide an enriched learning experience.

At first, chemical engineers found

"co-op" placements through the College of Engineering but when employers began to include chemists for these positions, a similar program was developed for the Chemical Science students. The program has grown from five students, when it started, to 28 students today, employed by 14 nationwide industries.

Alumni Find A Ready Welcome

The placement office touches students' lives in many ways. It is a resource center that can help identify speakers for the American Institute of Chemical Engineers (AIChE), for the American Chemical Society (ACS), for the Chemical Seminars (ChemSem) or for recruiting workshops. In all of this, the alumni play an important role. Becky Simon admits that one of the treats of being Director of the Placement Office is seeing former students as recruiters (or speakers) for their companies.

"For our office", she says, "it is always a joy to see our former students and to find out how things are going with career and family. For all of us, it helps that they understand our candidates and our system. Recruiter-alums have an opportunity to renew acquaintances, to catch up on school news and to 'sell' their company. They return with pride and confidence in themselves and in their employers—and with the expectation of finding good candidates".



Unraveling The Mysteries Of Cell Growth



Professor of Biochemistry, H.E. Conrad, is closing in on the actions of a naturally occurring substance that may play a role in determining whether cell division is controlled normally or proceeds out of control, producing cancer-like tumors.

The substance is heparan sulfate proteoglycan (HSPG), a product synthesized by all animal cells. To date its function is unknown, but Professor Conrad's research suggests that, in some cells at least, it plays a role in the control of cell division.

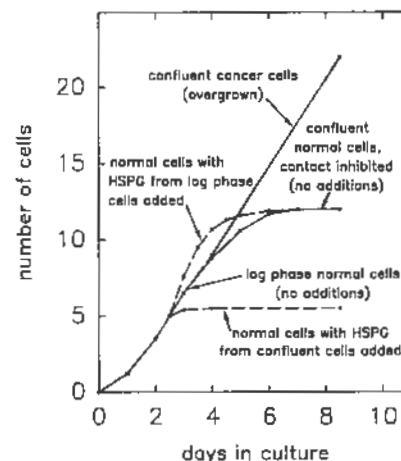
The HSPG is initially secreted from cells as a structure which is anchored in the cell's plasma membrane. Some of the secreted material is then taken back into the cell of origin. Most of this material is delivered to the lysosomes, where it is degraded, but about 10%–15% of the material goes into the nucleus of the cells, where it stays for a short time before it too is sent to the lysosomes and degraded. Thus, the HSPG in the nucleus reaches a steady state level which is controlled by the relative rates at which HSPG is transported into and out of the nucleus.

One of the findings of this research is that the steady state level of HSPG changes depending on the rate of cell division. Cultured cells grown on plastic dishes, normally do not stack up vertically but grow in a monolayer. As shown in the Figure, there are two stages of normal cell growth, a stage where the number of cells increases at a logarithmic rate, and a stage where growth is inhibited after the number of cells becomes so large that the cells come into contact with each other, i.e. the cells become "contact inhibited" when they reach "confluence". In the contact inhibited state, when the cells have stopped growing, the steady state level of HSPG in the nucleus is three times higher than in the rapid growth stage.

Extension of this observation has led to an interesting correlation: a rise in the HSPG in the nucleus of the cells is associated with the slowing or cessation of cell division, whereas a lowering of the nuclear HSPG is accompanied by a rise in the rate of cell division. No one yet knows whether these events are causally related and, if so, which causes which. In other words, it is not yet known whether a higher level of HSPG slows cell division or whether a decrease in the rate of cell division causes an increase in the level of nuclear HSPG.

The dashed lines in the Figure show experiments done on rat hepatocytes in which the addition of HSPG, isolated from confluent cells, to growing cells, artificially raises the level of nuclear HSPG and inhibits cell growth. The growth of cells in the logarithmic stage can be stimulated by adding HSPG extracted from cells in the log stage of growth. The research suggests that HSPG

EFFECT OF HSPG ON CELL GROWTH



formed by confluent hepatocytes plays a role in the prevention of cell division whereas HSPG formed by rapidly growing cells plays a role in the stimulation of cell division.

The Figure also shows that, whereas normal cells stop dividing when they come into contact with each other, cancer cells have lost the capacity to regulate their own growth, and keep on dividing after they reach confluence. Therefore, it may be possible to inhibit growth of cancer cells by supplying them with HSPG taken from confluent normal cells. However, many questions remain unanswered. Is this process specific to a certain type of cells, such as rat liver cells, on which the experiments have been performed so far, or is it applicable to other cells as well? By what mechanism does HSPG affect cell growth? Is the correlation between HSPG metabolism and cell growth direct or indirect, i.e. are both variables related to a third, as yet unknown factor?

As Professor Conrad says, "We are only in an early stage of the research". HSPG is only one of many factors that are known to regulate cell growth and its place among these factors remains to be established. However, the findings to date suggest that this may be an important new development in learning how cells control their own growth.

Harry G. Drickamer: A Stand Out Among Outstanding Colleagues



This year, Harry Drickamer has become the 12th winner of the prestigious Robert A. Welch Award, selected for "important chemical research contributions which have a significant, positive influence on mankind." At the press conference announcing the award, Dr. Norman Hackerman, Chairman of the Welch Foundation Scientific Advisory Board, described Drickamer as "a scientist as a scientist should be portrayed."

Another speaker described Drickamer as a scientist "who stayed in the lab" and produced not only first class science but also a long string of first class Ph.D. students. The speaker probably did not realize that Drickamer literally spends his days and nights in the laboratory. Now that age is slowing him down, he regretfully ends his lab day as early as 10 PM.

Professor Drickamer has been described by his colleague, Professor Larry Faulkner, head of the Chemistry Department, as one of the "most creative and influential figures in physical chemistry for almost four decades". Drickamer has developed and exploited the concept of "pressure tuning" for the study of electronic phenomena. His work originally evolved out of his interest in fluids—liquids and dense gases—and from his interest in molecular motion, including the process of diffusion and thermal diffusion.

"Pressure Tuning"

In 1953-54 Drickamer turned to the study of pressure effects on molecular and electronic spectra and showed that pressure affects various electronic orbitals to different degrees. This occurs because pressure decreases the interatomic and intermolecular distances and therefore increases the overlap of the outer electronic orbitals and the relative energies of the orbitals representing the ground and excited states. Since different types of orbitals have different spatial characteristics, they are perturbed to a different extent, which he described as "pressure tuning".

The variety of scientific discoveries that have come out of his lab is so vast that many of his colleagues have developed series of lists to describe Drickamer: lists of the scientific fields on which his work has impinged, lists of theories he has tested with pressure tuning, lists of electronic ground states he has discovered. For instance, one colleague, Professor Gutowsky, listed the following as fields in which Drickamer has made important contributions: solid state chemistry, chemical physics, physical, inorganic, organic, and biochemistry, as well as geochemistry, geophysics, and biophysics. Drickamer's current tripartite appointment in Chemical Engineering, Chemistry, and Physics just covers the tip of the iceberg.

Drickamer's basic contribution has been to demonstrate that high pressure is a powerful and versatile tool for studying the properties of atoms and molecules—the essence of modern science. One of the most exciting aspects of Drickamer's work was to discover that electronic transitions (changes in ground state) are induced by pressure in a wide variety of materials. For instance, insulators like iodine and sulfur, become metals at high pressure.

Working with Professor Gregorio Weber of Biochemistry, Drickamer changed the enzymatic activity of proteins without heating, and thus denaturing the material. Under modest pressures, he was able to change the conformation of the protein (which determines its function)

and to follow the process with fluorescent probes without causing irreversible changes. With Professor Nick Holonyak of Electrical Engineering and his colleagues, Drickamer made fundamental studies of light emitting diodes and quantum well lasers, two materials at the forefront of modern electronic technology.

A Self Taught Man

These achievements are doubly remarkable because Drickamer was essentially "self taught" even though he went through the proper academic motions. In his early years, toughness and survival were his chief objectives, not education or knowledge. He went to college because jobs in the steel mills and on the street cars did not lead anywhere and he did not want to follow his friends into these blind alleys. A football scholarship lured him to Vanderbilt University for one year and an offer of a room and board job brought him to the University of Michigan. He briefly considered a career in sports but found that even in baseball, which was his best, he was not very good. Nevertheless, he was good enough to play semiprofessional ball.

At Michigan, he drifted into engineering because this was the depression, 1936-37, and he had heard that engineering lead to jobs. He first tried geology but after he heard that one needed a Ph.D., which took a long time to acquire, he switched to chemical engineering where one could get a job more quickly.

He had some good instructors, found the coursework reasonably interesting, and did well in his classes but was not sufficiently focused in his career goals to take his studies very seriously. In his senior year he was elected president of the engineering class even though non-fraternity students who had transferred in from another university and who had participated only modestly in extra-curricular activities, were usually not considered presidential material.

After completing his bachelor's degree, he continued at Michigan for two

semesters and received his M.S. in chemical engineering, still without a definite career in mind. The most successful part of the year was meeting Mae Elizabeth McFillen and persuading her to become his wife. Before leaving for his first "real" job at Pan American Refining Corporation, he took the Ph.D. qualifying examinations on a whim. These consisted of 16 hours of tests usually taken over two semesters. He took them on consecutive days and passed!

Getting "Turned On" To Science

At Pan Am, he met Harry Hummel, a colleague of about the same age, and through that association he finally became "turned on" to science. With Hummel, he spent his spare time, such as lunch hours, and after work (the work week was 48 hours), working through texts on physics, differential equations, and quantum mechanics. Also in his spare time, Drickamer completed a set of thermo-dynamic measurements which were accepted as a doctoral thesis by the University of Michigan. In addition, together with Harry Hummel, he did a plant test on an extractive distillation tower, the first of its kind in the world. The publication which resulted from this work earned the two young researchers the Colburn Award in 1947.

In 1946, Drickamer returned to Michigan, thesis in hand, to polish off the remaining 22 course credits he needed for a Ph.D. He completed the course work in one semester, taking whatever fitted his schedule, and recalls that the main problem was that his first child was born the day before finals began. By then, Drickamer had definitely turned to science rather than engineering, and accepted a position as assistant professor at the University of Illinois, in part because chemistry and chemical engineering were in the same department at that time and he could follow his broad scientific interests.

Recognition By The Scientific Community Began . . .

After he built his lab and the quality and range of his results spread through the academic community, recognition soon followed from Chemistry, from Physics, and from Chemical Engineering. In 1956 he received the Ipatieff Prize from the



American Chemical Society. This was followed in 1967 by the Buckley Award from the American Physical Society and the Alpha Chi Sigma Award from the American Institute of Chemical Engineers and, in 1968, by the Bendix Research Prize given by the American Society for Engineering Education. In 1972, he received the William H. Walker Award from the American Institute of Chemical Engineers and in 1974, the prestigious Irving Langmuir Award in Chemical Physics from the American Chemical Society.

In 1977 he became the first winner of the P.W. Bridgman Award, named after the pioneer in high pressure studies. In 1978 he won the important Michelson-Morley Award, given to the outstanding scientists of the second half of the 20th century. Prior winners had included J.H. Van Vleck, the "father of modern magnetism", Edwin Land, inventor of polaroid, and John Bardeen, inventor of

the transistor and two times Nobel laureate.

And Increased As The Years Passed

If a man is known by the company he keeps, Drickamer had made it into the realm of the stars. The John Scott Award, which he received in 1984, was first awarded to M. Curie in 1921. In 1924, it was awarded to F.G. Banting for the discovery of insulin, in 1931 to G. Marconi for his invention of wireless telegraphy, and in 1943 to V. Bush for the differential analyzer.

In 1986, Drickamer received an Alexander von Humboldt Award from the Federal Republic of Germany. In 1987, he received both the Peter Debye Award in Physical Chemistry, and the Robert A. Welch Prize in Chemistry, both of which carry enormous prestige.

In addition to his many prizes, Drickamer has been invited to join most of the important scientific societies in this country. Since 1965, he has been a member of the National Academy of Sciences. He was elected a Fellow of the American Academy of Arts and Sciences in 1970 and a member of the National Academy of Engineering in 1979. In 1983, he became a member of the American Philosophical Society, founded by Benjamin Franklin in 1743.

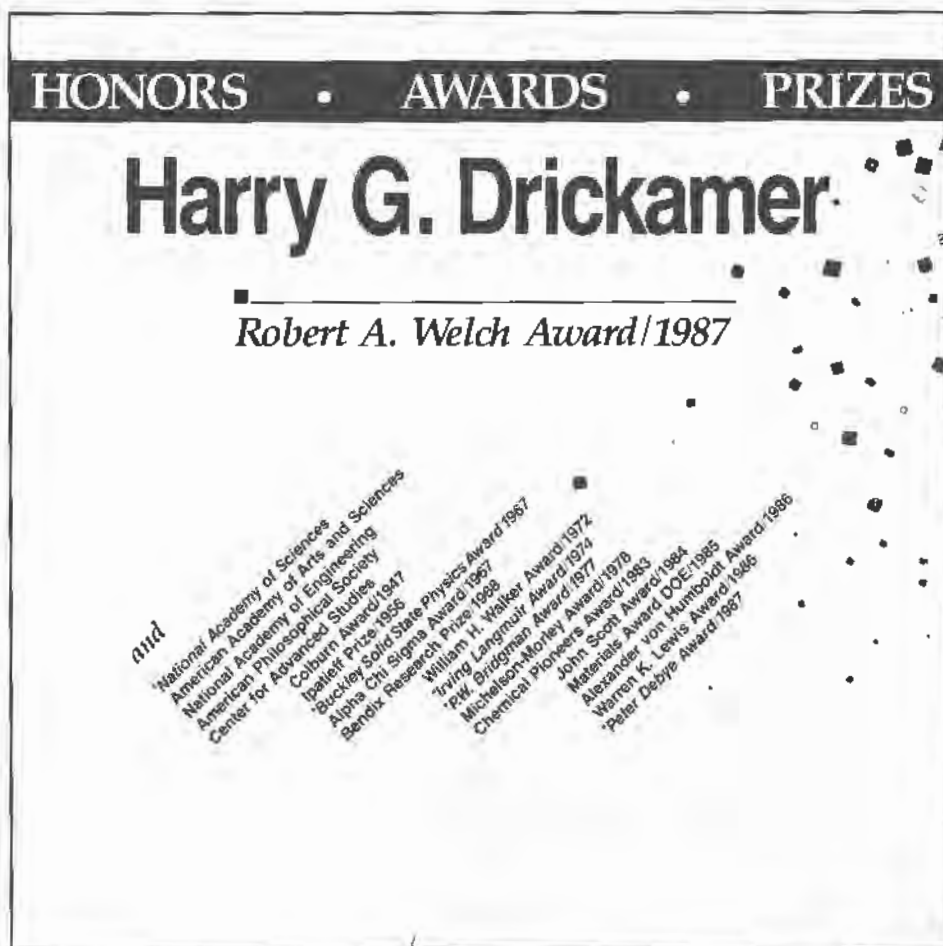
In view of his indirect association with Benjamin Franklin, it is appropriate that Drickamer's primary avocation is reading history. He particularly enjoys ancient history but will read anything up to World War II. After that date, he thinks that the data are not yet complete, which defeats the purpose because "the great advantage of reading history is that you know ahead of time how it will all turn out."

His Recipe For Success

Drickamer ascribes success in science to four characteristics: the ability to think analytically, good scientific intuition, drive, and luck. He says that, for him, the last three factors, which he possesses in considerable degree, make up for his modest analytical talents.

He starts a project with little more than a general idea that a subject may be worth investigating. Then, after he has done some experiments and obtained some data, he is inspired to do some deeper reading and to bring the subject to the point where it is accepted and taken up by others. When that level of development is reached, he turns his attention to a new subject and leaves the details to others.

He has physical and mental energy in abundance. Vacations become an endurance test after a very few days. His mental energy is awesome. He used to be able to concentrate on the same subject all day long and regrets that he now has to take occasional breaks from hard mental work, because he is "slowing down".



He gives a great deal of credit to "good luck" and points out that this is consistent with the lessons of history. He has read that when the Vikings selected a leader they did not choose the bravest or the most skillful, although they assumed that all their warriors had those traits. Instead they looked for a lucky man. Leif Ericson, the explorer, was known as "Leif the Lucky" and Drickamer is convinced that he was lucky to have been working at a time when good scientific intuition could substitute for deep theoretical knowledge. And he is not about to stop. When he was asked what he and Mae Elizabeth, his delightful wife, would do with the fortune that he would win with the Welch Prize, he said, "She can do anything she wants so long as she lets me stay in the lab".

The banner presented to Drickamer at the party celebrating his winning the Robert A. Welch Award.

The Way Things Were

by Edward T. Howell,
B.S. '19, M.S. '20



The country was recovering from WWI. The Chemistry Department was in a state of transition with the arrival of a promising young professor of chemistry from Harvard, Roger Adams, assigned to relieve Professor Noyes of the Organic lectures. Isotopes were being discovered. This was of great interest to Professor Noyes, a large part of whose research had been devoted to refining the atomic weights of some of the elements. Isotopes explained why some of the atomic weights were not whole numbers compared with oxygen. All this happened in my senior year.

I had done well academically during the previous three years but inexplicably I flunked the final exam in Organic. This was especially embarrassing because it was the field which I intended to follow. However, in such cases, the University allowed students to repeat a final exam for a five dollar fee, which I did. The test was held in Professor Noyes' office with questions provided by Professor Noyes himself. I received a 100 on the exam and my final grade in Organic was changed from an E to an A, resulting in my initiation into Phi Lambda Upsilon.

In those days, outstanding students who wanted to go on to graduate studies were offered certain inducements. In addition to being offered a part time graduate assistantship, to help pay expenses, credits towards the Master's degree were offered for work done in the Prep Lab during the summer, plus monetary hourly compensation. That's how one could get a Master's degree in one year after the Bachelor's. In later years I was able to say truthfully that I had been on the chemistry faculty at the University of Illinois (but did not say that it had been on the lowest rung of the ladder).

The Prep. Lab. in those days helped the war effort by making chemicals that were no longer available from Germany. For years, researchers had been dependent for specialty chemicals on the German firm of Kahlbaum. This source, of course, was cut off during WWI. The situation became

so critical that the department, at Dr. Adam's behest, decided to offer a similar, but limited, service to academic as well as industrial users. The project was placed under the supervision of Speed Marvel who was just about to receive his Ph.D. and who hired me to work in the Prep Lab that summer. My job was to make furfural from corn cobs and to provide several fractions of long chain fatty acids by alcoholysis of palm oil followed by fractional distillation. Later, Eastman Kodak Company agreed to take over the function of the Prep Lab and expanded the list of chemicals.

My oral exam for the Master's was conducted by Professor Oliver Kamm, who knew that I would be offered a job with Newport Chemicals in Milwaukee and slanted the questions to what I needed to know for the job. My undergraduate studies had been slanted towards chemical engineering. My major leading to the Master's was Advanced Organic, conducted by Roger Adams. In later work with the DuPont Company (dyes and pigments), both disciplines stood me in good stead.

At Newport I was given the job of developing a dye to put on camouflage canvas that would reflect infrared dye like foliage. It was to be used to fool the infrared detectors that we thought the Germans had. The dye I developed was the first black anthroquinone. Only much later did we find out that the German air force were not equipped to detect infrared. But we got the patent.

Later, DuPont bought out my company in order to get the patents. I was prepared to leave and was already job hunting when DuPont asked me to stay and I did—until I retired.

The article on "Farwell's" and other reminiscences prompted me to write my own. It gives me a warm feeling to be counted an alumnus of the Chemistry Department, along with the host of chemists and chemical engineers of later years.

Alumni News

Drew First President Of Hoechst Celanese

Ernest H. Drew Ph.D. 1962 (Organic Chemistry with J.C. Martin) has been appointed first president and CEO of Hoechst Celanese, a new \$4.6 Billion company, formed when American Hoechst acquired Celanese. To smoothly integrate the two companies, Drew will draw on his 21 years of experience at Celanese in chemical research, technical service, sales, strategic planning and international management. Before the merger, Drew was group Vice-President at Celanese, where he ran the company's commodity businesses, and was known for his "open and participatory" management style. Hoechst Celanese has operations in pharmaceuticals, fine chemicals, films, fibers, engineering plastics, and new technologies.

Alumni Awards

Dr. **John Franz**, B.S. in Chemistry (1951) and since 1980, a Distinguished Fellow at the Monsanto Corporation, was one of only four winners of the National Medal of Technology in 1987. He received his Ph.D. from the University of Minnesota in 1955. The medal was awarded for "his discovery of the herbicidal properties of glyphosates, which have had significant consequences upon the production of agricultural food and fiber". In the same year he also won the Outstanding Achievement Award presented by the University of Minnesota to recognize former students who have attained distinction and honor in their fields.

In Memoriam

We have received word that Mr. **Christopher K. Beebe**, B.S. 1914 (Chemical Engineering) has passed away. He was Chief Chemist of the Division of Foods and Dairies for the Illinois Department of Agriculture in Chicago.

James N. Gerber B.S. 1968 (Chemistry) died on April 8, 1984. He received his Ph.D. in Chemistry from the University of California, Riverside, and at the time of his death, was working for Hewlett-Packard as a product specialist.

Professor **Douglas Nicholson** Ph.D. 1934 (Inorganic Chemistry with Reedy) died on April 15, 1987. Professor Nicholson was a Professor of Chemistry at the University of Pittsburgh from 1945-49. He was director of educational services with Fisher Scientific Co. from 1949-53, and Professor at East Tennessee State University from 1953 until his retirement in 1974. He served as Department Chairman from 1959-74. In addition, Professor Nicholson was active in a variety of professional and civic endeavors, including the Boy Scout program, where he received the Silver Beaver Award.

Professor **Ralph L. Seifert** Ph.D. 1937 (Chemistry with Phipps) died on April 23, 1987. He had taught chemistry in various schools including Alma College in Michigan and Carleton College in Northfield, MN. He had also carried out research at the Respiration Laboratory at the University of Chicago, the Manhattan Project at the University of Chicago and at Argonne National Laboratories.

Dr. **Clarence A. Stiegman** Ph.D. 1937 (Chemistry with Bailar) died on June 10, 1987. At the time of his retirement in 1969 he was Vice-President of Research and Development at Hooker Chemical Company, now Occidental Chemical Corporation. He administered corporate and divisional departments with some 650 research scientists and laboratory specialists and had seen more than 1,300 patents filed by his staff. He was also a very prominent community leader with a wide range of interests. While a student

at Illinois he was an active musician, playing both piano and trumpet at local events.

News of the Classes

In the last issue we reported that we had been informed that **Charles Fisher** Ph.D. 1931 (Chemistry) had passed away. Soon after, we received a letter from Professor Fisher himself (Ph.D. 1932 in Organic Chemistry with Fuson) indicating that the obituary had been premature. He had heard about his "demise" after returning from a meeting of the American Oil Chemists Society where he had presented a paper. He is currently Adjunct Research Professor in Chemistry at Roanoke College and has just co-authored a book, *Profiles of Eminent American Chemists*, to be published by Litarvan Literature in 1987.

'40

Dr. **Don Seeley McClellan** M.S. 1940 (Chemistry) is a urologist with the Kaiser Permanente Medical Center, specializing in therapy of male impotence and surgery for insertion of penile prostheses.

'42

C.S. Michals B.S. 1942 (Chemical Engineering) retired last January from Airco Industrial Gases where he had been Manager of Engineering and Analysis.

'46

M.J. Coon Ph.D. 1946 (Biochemistry with Rose), currently Victor C. Vaughan Distinguished University Professor and Chairman of the Department of Biological Chemistry at the University of Michigan Medical School, has been elected a Senior Member of the Institute of Medicine of the National Academy of Sciences. He was distinguished Lecturer at the University of Cincinnati in January and received an Hon. D.Sc. Degree last May from Northeastern Ohio Universities College of Medicine.

Albert S. Humphrey B.S. 1946 (Chemical Engineering), Chairman of Business Planning and Development Inc. was elected a Director of Sleeveprint Ltd., a company which specializes in printing record sleeves and compact disc packaging. Mr. Humphrey is a recognized authority on participation, team building, and organizational change and has developed a system which received endorsement from the University of Hull's Management School.

'47

Byron R. Bird B.S. 1947 (Chemical Engineering) and currently Professor of Chemical Engineering at the University of Wisconsin at Madison, reported publication of the second edition of his two-volume treatise "*Dynamics of Polymeric Liquids*," by John Wiley & Son. The books were written by Professor Bird with co-authors.

'48

Dr. Ernest L. Eliel Ph.D. 1948 (Organic Chemistry with Snyder), currently W.R. Kenan Jr. Professor of Chemistry at the University of North Carolina at Chapel Hill, has been elected Chairman of the American Chemical Society's Board of Directors.

'49

Dr. Paul E. Hoch Ph.D. 1948 (Organic Chemistry with Fuson) retired from Stauffer Chemical Company where he had been Director, Western Research Laboratories and Chief Scientist. He is currently consulting for Stauffer in Agricultural Chemicals.

Dr. Joseph Larner M.S. 1949 (Chemistry) received the 1987 Banting Medal for Distinguished Scientific Achievement, the highest scientific award presented by the American Diabetes Association. Dr. Larner is currently Director of the Diabetes Research and Training Center and Alumni Professor and Chairman of the Department of Pharmacology at the University of Virginia School of Medicine.

Donald I. Walker B.S. 1948 (Chemistry) retired last June as Executive Director of

Associated Western Universities after more than eleven years of service.

'51

Albert L. Babb Ph.D. 1951 (Chemical Engineering with Drickamer), currently Professor of Nuclear Engineering, Chemical Engineering and Bioengineering at the University of Washington in Seattle, received the 1987 award as Outstanding Teacher from the College of Engineering. The award was given "in recognition of his exceptional record in imparting to his students the excitement of creative engineering and the responsibilities of engineers to their clients and to the public".

'60

Jack Hausser Ph.D. 1960 (Organic Chemistry with Curtin), currently Professor of Chemistry at Duquesne University, received the 1987 President's Faculty Award for Excellence in Community Service. Among his many contributions are serving as a member of the University Computer Steering Committee, establishing and co-directing the College Writing Center, and promoting acceptance of the University's new core curriculum.

'62

Dr. Charles A. Garber B.S. 1962 (Chemical Engineering) is president of Structure Probe, one of the nation's largest independent laboratories, specializing in electron microscopy and surface analysis studies. He served as an elected delegate to the White House Conference on Small Business in August, 1986 and in June, 1987 was invited to testify before the US House Ways and Means Committee on the subject of unfair competition between tax-exempt nonprofit organizations and small business.

'65

In August Professor **George S. Wilson** Ph.D. 1965 (Analytical Chemistry with Hartley) became the Higuchi Distinguished Professor of Chemistry and Pharmaceutical Chemistry at the University of Kansas, where a major

program in the area of bioanalytical chemistry is being established.

'69

Gary M. Hiestje Ph.D. 1969 (Chemistry with Malmstadt) and currently professor at Indiana University, won the 1987 ACS Award in Analytical Chemistry "for his innovative contributions to an understanding of processes that occur in analytical flame and plasma spectrometry and for leadership in training students and colleagues in the science and philosophy of modern analytical chemistry".

Roger Nass M.S. 1969 (Chemistry) was promoted to Division Vice-President of Industrial Division Research at Nalco Chemical Company. The company is the world's largest producer of specialty chemicals and services for water and waste treatment, pollution control, petroleum production and refining, papermaking, mining, steelmaking, metalworking and other industrial processes.

'75

Steven Schmid B.S. 1975 (Chemistry) is currently working in market development for radiation curable coatings for DeSoto, Inc. In 1986, he won an "I.R. 100" Award for the development of electron beam curable DeSolite™ magnetic media binder resins. On the award winning team were two other Illinois Alums, **Leonard Laskin** M.S. 1948 (Chemistry) was team leader and **Bob Ansel** B.S. 1951 (Chemistry) was another team member.

'77

Richard W. Lintou Ph.D. 1977 (Analytical Chemistry with Natusch), Associate Professor of Chemistry at the University of North Carolina at Chapel Hill, was appointed Assistant Vice-President for Research, University of North Carolina General Administration. The General Administration oversees the 16 constituent institutions in the UNC system.

Dr. **Michael J. Potts** A.B. 1981 (Chemistry) was elected a Fellow in the American Academy of Pediatrics.

Deborah S. Temperly B.S. 1975 (Teaching of Physical Science) and M.S. 1977 (Chemistry), now Associate Professor and Chairwoman of the Mathematics and Science Department at Northwood Institute in Midland, MI, was awarded the 1987 Faculty Excellence Award.

'79

Dr. **Carol Ashby** Ph.D. 1979 (Chemistry with Brown), currently with Sandia National Laboratories, won the YWCA award for "Women on the Move" in the Science/Engineering/High Technology category.

Dr. **Timothy Faley** B.S. 1979 (Chemical Engineering) recently completed his Ph.D. in Chemical Engineering at the University of Notre Dame and took a position as Assistant Professor in the newly formed Department of Chemical Engineering at North Carolina A & T State University in Greensboro.

Steven L. Suib Ph.D. 1979 (Chemistry with Stucky), Professor of Chemistry at the University of Connecticut received the 1986 ACS Connecticut Valley Section award "for outstanding contributions during the formative years of his career".

'80

Raul Oteiza M.S. 1980 (Chemistry) has joined the Horizon Chemical Division of A.E. Staley Manufacturing Company as product manager, methyl glucoside.

'82

Kurt Carlsen B.S. 1981 (Chemistry) and B.S. 1982 (Chemical Engineering) has been promoted to Regional Applications Manager at the Industrial Gases Division of the Liquid Air Corporation. In 1984 and 1985 Carlsen was named the company's top performing Applications Engineer in the United States.

Dr. **Charles Purdy** B.S. 1982 (Chemistry) graduated this spring from Southern Illinois University School of Medicine with honors in the psychiatry clerkship.

'83

David Bitzer B.S. 1983 (Biochemistry) completed his M.D. degree at Southern Illinois University School of Medicine last May. He received the 1986 Student Research Award for his work on "The Use of Piroxicam in Tumor Inhibition".

'85

Dr. **Charles Ruffing** Ph.D. 1985 (Inorganic Chemistry with Rauchfuss) has accepted a position with Aldrich Chemicals as senior chemist in their production department.

'86

Simone S. Vandeberg B.S. 1986 (Chemistry) was named staff consultant in Management Information Consulting at Arthur Anderson Co. in their Houston Office.

KEEP IN TOUCH

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Your news (please include newspaper clippings, photos, extra sheets, etc.)

Dr. **Michael J. Potts** A.B. 1981 (Chemistry) was elected a Fellow in the American Academy of Pediatrics.

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Your news (please include newspaper clippings, photos, extra sheets, etc.)



Graduation reception under the arches at Noyes Lab, following commencement ceremonies.

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