ALUMNI NEWS
School of Chemical Sciences
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN #34 JUNE 1995

Chemistry Department Welcomes its First Fully Endowed Chair

To honor her husband's memory, Mrs. Joyce Eiszner has endowed the James R. Eiszner Distinguished Chair in Chemistry. Dr. Eiszner, who, at the time of his death in 1990, was Chairman and Director of CPC International Inc., received a B.S. in chemistry from the U. of I. in 1950. In establishing the Chair, Mrs. Eiszner fulfilled a wish he had often expressed in his lifetime.

Dr. Eiszner had a remarkable career. After receiving a Ph.D. at the University of Chicago in 1952, he took a position as chemist with Standard Oil of Indiana. and moved to Indoil Chemical Company in 1954. He subsequently served as director of market development with Amoco Chemicals Company from 1957 to 1963, before beginning his career at Ott Chemical Company in Muskegon MI, where he became president in 1967.

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Dr. James R. Eiszner

Dr. Meredith Mallory Establishes Chair in General Chemistry

An undergraduate who received his degree in Sciences and Letters at the U. of I. in 1940, Dr. Meredith Mallory has established the Murchison-Mallory Chair in Chemistry to foster "the delivery of education and training in the hard sciences." He chose to establish the Chair in Chemistry in order to recognize the department's excellent reputation in providing fundamental instruction to a wide range of students in fields such as engineering and medicine, as well as to chemistry majors. Dr. Mallory was impressed with the ability of our general chemistry staff to integrate theoretical and applied research findings as well as historical perspectives into an attractive introductory chemistry curriculum. He firmly believes in the importance of training in the hard sciences and has also established a chair in physics at Tulane University, where he received his MD degree.

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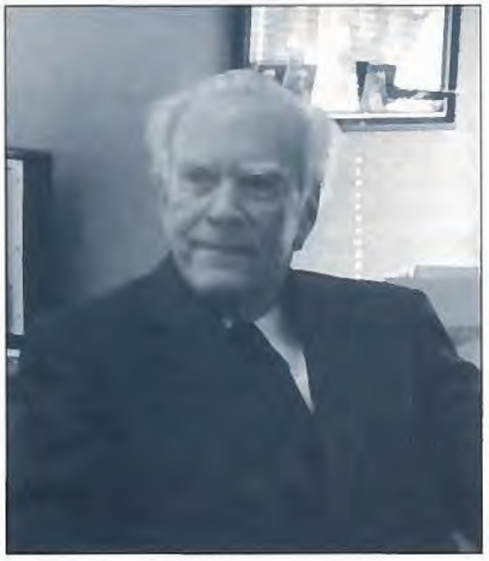
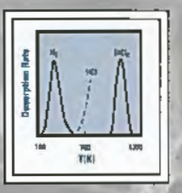


Dr. Meredith Mallory

INSIDE



What is a Chair?

In the world of academia, a Chair is a special position that carries enormous prestige and provides a high degree of freedom in pursuing scholarly activities. A Chair creates an unparalleled opportunity for a truly gifted teacher and researcher to fully develop his or her potential and to make major scholarly contributions. A named Chair is usually funded by an endowment that provides income to cover salary and some research or travel expenses.

In thanking our donors for our first Chairs in the School of Chemical Science, Stephen Sligar, Director of the School, and Paul Bohn, Head of the Chemistry Department, said, "For those of us who are committed to an academic career, a Chair is the pinnacle of success. For a department, an endowed Chair affirms our commitment to excellence by allowing us to attract and retain the very best person to join an already outstanding faculty. For other faculty in the department, a Chair is a source of pride that is shared by all and a lodestar towards which we can strive."

Faculty appointed to the chairs will join a distinguished group, listed below, who currently hold named professorships in the School of Chemical Sciences.

- **John A. Katzenellenbogen,** Roger Adams Professor of Chemistry
- **Scott E. Denmark,** R.C. Fuson Professor of Chemistry
- **Nelson Leonard,** R.C. Fuson Professor of Chemistry (Emeritus)
- **Peter G. Wolynes,** Lycan Professor of Chemistry
- **Stephen G. Sligar,** Lycan Professor of Biochemistry
- **Thomas J. Hanratty,** Westwater Professor of Chemical Engineering
- **Anthony J. McHugh,** Alumni Professor of Chemical Engineering
- **Charles F. Zukoski,** Alumni Professor of Chemical Engineering
- **Kenneth S. Suslick,** Alumni Research Scholar, Chemistry

Eiszner Chair

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In 1970, he moved to CPC International, a company which he transformed from "a stodgy producer of commodities to an aggressive marketer of some of America's favorite foods," including Skippy peanut butter and Hellman's mayonnaise. In 1979, he became president and CEO and in 1987 he was elevated to chairman. Under his leadership, the company continued to thrive. Eiszner was sufficiently resourceful and successful to discourage persistent predators who tried to break the company apart and sell the pieces. In 1989, the year before his death, CPC International was ranked No. 100 in the Fortune 500 list.

"You can rest assured that holders of the Chair will share your husband's leadership qualities, as well as his commitment to ethical conduct and the highest scientific standards."

While at the University of Illinois Dr. Eiszner took time for football and for the parade ground units, for Pi Kappa Lambda and Phi Lambda Upsilon. He was very proud of the education he received at the U. of I. He was known to wear Illinois cufflinks and, when he went out casually, a blazer with Illinois buttons.

Dr. Eiszner was noted for his modesty and unostentatious manner both in his personal life and in his style of corporate leadership. After his death, his successor CEO described Eiszner as "a strong leader and motivator, an advocate of ethical business conduct and one who insisted on high quality and value for the customer and consumer."

In thanking Mrs. Eiszner for her gift, Stephen Sligar, Director of the School of Chemical Sciences, and Paul Bohn, Head of the Chemistry Department, wrote, "You can rest assured that holders of the Chair will share your husband's leadership qualities, as well as his commitment to ethical conduct and the highest scientific standards. The holder of the James R. Eiszner Chair will help us to maintain and improve the very highest standards for education and training of the young people whom we prize and will add to the reservoir of knowledge that will hasten the evolution of our science, two goals which your husband would have heartily endorsed.

We are deeply honored to have this opportunity to carry forward the legacy of Dr. James R. Eiszner who was an outstanding leader at CPC International. We, too, are leaders in chemical research and teaching in the United States and in the world. We rank among the top half dozen programs in the country, and our students receive a superb education because of it. The establishment of the James R. Eiszner Chair in our program will be an important step in ensuring that this special heritage will continue into the twenty-first century."

Murchison-Mallory Chair

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Dr. Meredith began his career on active duty in WWII while still in medical training. He received his commission during his internship and undertook a specialized course of study to help the army monitor the radiological safety of staff who were exposed to radiation from the Pacific bomb tests. He was subsequently promoted into administration and worked at the General Staff College and became Division Surgeon in Korea. In 1954 he entered the family's oil and gas business as an independent producer and is now president of Mallory Investments.

He continues to hold the U. of I. in high esteem and has fond memories of his years on this campus. For this reason he made the U. of I. beneficiary of a paid up life insurance policy which will become the deferred portion of the endowment for the chair. As he said, "I hope that, with this chair, I can made a small contribution to the teaching of hard sciences at the University of Illinois."

Professor Paul Bohn, Head of the Department of Chemistry said, "We are truly fortunate to have friends with the vision, commitment, and leadership of Meredith Mallory. The Chair, which he has been instrumental in establishing, will serve as a standard for the integration of teaching and research in the work of a world-class scholar and will provide much benefit to future generations of Illinois chemists."

Chemistry Garners Record Number Packard Fellowships

Since 1989, five faculty in our chemistry department have received Packard fellowships, fully one-quarter of the total awarded to all chemistry departments nationwide.

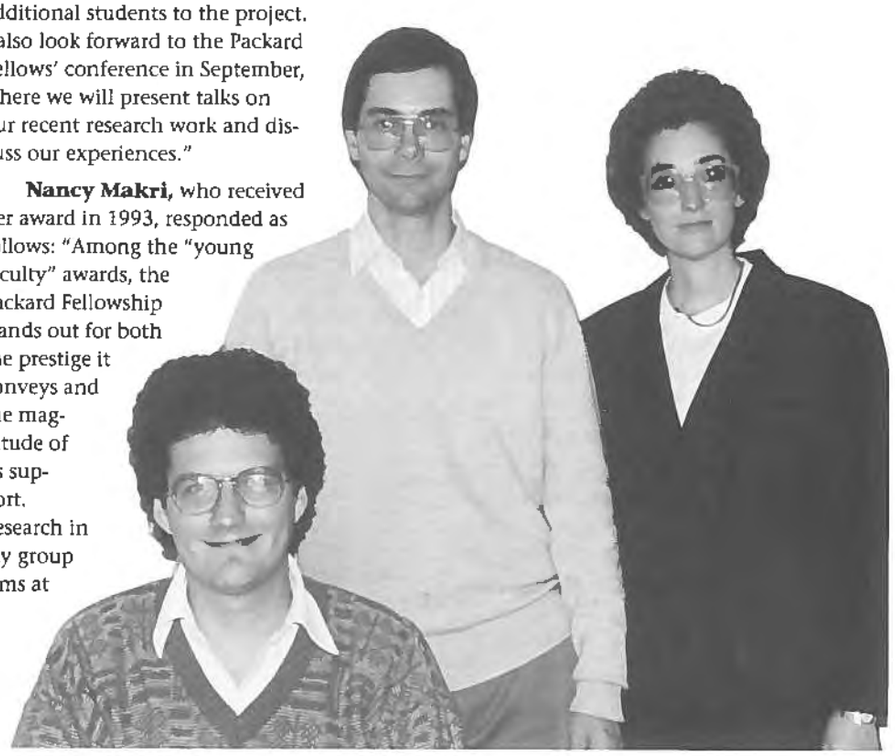
As most of our readers are well aware, the Chemistry Department at Illinois has enjoyed a distinguished history. In the "Golden Age" of the '40s and '50s, under the leadership of Roger Adams and Carl "Speed" Marvel, Illinois was the undisputed leader in the nation. Since that time, the field has changed and expanded and the number of chemistry departments has grown enormously. But some things remain the same, including the outstanding quality of the chemistry program at the University of Illinois. We still rank among the top half dozen in the nation.

Recent evidence of continuing high quality comes from the record of David and Lucile Packard Fellowships for Science and Engineering that have been won by young chemistry faculty at Illinois. The fellowships are highly competitive and are awarded nationally to reward and support innovative individual research programs in the natural sciences. They carry great prestige and significant research support for a five year period. Since 1989, five faculty in our chemistry department have received Packard fellowships, fully one-quarter of the total awarded to all chemistry departments nationwide. When asked to indicate what the fellowship has meant to them our Packard Fellows responded enthusiastically.

According to **Martin Gruebele**, a 1994 Packard Fellow, "Receiving a Packard Fellowship was truly useful in pursuing my research. Not only is it prestigious, as many of the private foundation fellowships, but it carries a large award of research money ($500,000 over 5 years) which can really make a difference for start-up projects that public funding agencies are hesitant to fund."

"I have used much of this year's funds, for example, to rebuild our protein folding dynamics study as an independent experiment in our lab and was able to add two additional students to the project. I also look forward to the Packard Fellows' conference in September, where we will present talks on our recent research work and discuss our experiences."

Nancy Makri, who received her award in 1993, responded as follows: "Among the "young faculty" awards, the Packard Fellowship stands out for both the prestige it conveys and the magnitude of its support. Research in my group aims at improving the understanding of quantum mechanical phenomena in condensed-phase dynamics through accurate simulations, starting from first principles. We have recently made a step towards this goal by developing a fully quantum mechanical methodology which is based on Feynman's path integral formulation of quantum mechanics and which allows, in many cases, converged calculations without introducing any uncontrolled approximations.



Professors Jonathan Sweedler, Martin Gruebele and Nancy Makri

Over the next several years, the Packard funds will support my research group by providing student and postdoctoral salaries as well as state-of-the-art computing equipment. This support will help us meet our challenging goal.

Jonathan Sweedler, a 1992 recipient, commented, "Since arriving at the University of Illinois four years ago, I have received several important honors and awards. Perhaps the most important is the Packard Fellowship, both in terms of the prestige and funding flexibility that it provides. "

"My group studies the distribution and release of neuropeptides from individual snail neurons. A large part of our work is the development of new analytical methods to study chemically complex small samples by developing new capillary electrophoresis separation techniques. The Packard Fellowship has allowed me to hire postdoctoral associates and purchase state-of-the-art equipment which has obviously increased my research productivity over the last years."

"The fellowship also represents the difference between having to make detailed plans for all experiments and the flexibility to pursue new research ideas as they open up. Such flexibility during one's first years as an assistant professor is both important and very rare."

"One example of a project that we have pursued solely because of Packard funding is an interdisciplinary project with members of the Electrical Engineering faculty to develop Nuclear Magnetic Resonance (NMR) methods to study nanoliter volume samples. We recently reported the first on-line coupling of NMR to capillary electrophoresis and are now working on the development of small scale NMR systems. The Packard Foundation Fellowship allows me to pursue exciting research opportunities in chemistry."

Faculty Research

Novel Approaches to Silicide Chemical Vapor Deposition

Edmund Seebauer, Professor of Chemical Engineering, has recently developed an experimentally-based theoretical model to predict optimum conditions for titanium silicide ($TiSi_2$) formation. The production procedure resulting from this model has permitted him to grow silicide material having properties of intense interest to the microelectronics industry.

Seebauer has been working with the industrial consortium represented by Semiconductor Research Corporation to develop new approaches to the metallization steps needed for smaller and faster silicon-based microelectronic devices. His methods draw heavily on fundamental chemistry but are very important for the semiconductor industry and very close to real practice. An invention disclosure has been filed and a patent application on the silicide is in process.

According to Leslie Allen, Assistant Professor of Material Science at the University of Illinois, "Ed has pioneered the use of gas phase chemistry CVD for making silicide contacts to semiconductors. The old method involved brute force evaporation. However, Ed uses a clever vapor phase chemistry technique to selectively deposit the silicide only in certain areas on the chip. As devices become even smaller, with dimensions of only a few tens of atoms, methods such as Ed's may be the only way to make such contacts."

Figure 1 shows pictorially how central these contacts are to the operation of electronics devices. Diagrammed is a schematic of a Metal-Oxide-Semiconductor-Field-Effect-Transistor (MOSFET), which, when reproduced in large numbers, lies at the heart of an integrated circuit. When an appropriate voltage is supplied to the gate region, current can flow between the source and drain regions.

A crucial step in the manufacture of this transistor is to deposit a thin layer (0.1(m) of $TiSi_2$ on the bare Si, avoiding those areas of the chip that are covered by silicon dioxide (SiO_2). The $TiSi_2$ is the black material in the diagram, laid on the doped layers of Si. The $TiSi_2$ connects the gate, source and drain regions in the transistor with the outside world, represented in the diagram by the aluminum wires. Since aluminum cannot be reliably connected to Si directly, the $TiSi_2$ is necessary as an electrically conducting intermediate layer. Many metallic elements form silicides, but titanium silicide is the material of choice because it has the best electrical conductivity. Ideally, a formation process should yield 100% selectivity of $TiSi_2$ on Si in a single step.

Professor Edmund Seebauer in his laboratory.

The most common method now in use for silicide formation is called the "salicide" process. This process reacts a layer of metallic titanium with underlying Si in the solid phase. One disadvantage of the salicide method is that it consumes some of the Si substrate and is therefore inapplicable to very shallow junctions because the underlying doped Si layer could disappear. Another major disadvantage is that, as the devices shrink, the salicide processing temperature rises above the acceptable limit of 750°C imposed by dopant diffusion. For these reasons, the salicide process is limited to applications in which transistor gate widths exceed about 0.35 µm. Current expectations are that gate widths will shrink down to 0.10 mm in about 12 years, so a new method for silicide formation is clearly needed.

Seebauer's approach to forming $TiSi_2$ is based on chemical vapor deposition (CVD). This method uses a gas, such as silane (SiH_4), as a silicon source and therefore can, in principle, avoid the problem of substrate consumption characteristic of the salicide process. The ideal CVD process can, in principle, be performed in a single step, in contrast to the salicide process, where the metallic titanium has to be stripped off after the silicide has been laid down. The CVD process also has better potential for the promising new Silicon-On-Insulator technology because the lack of Si consumption avoids the formation of holes in the Si layer.

The fundamental feature of CVD is that a gas is reacted with a solid to leave more solid behind. Two competing reactions occur in CVD of $TiSi_2$, an undesired "consumption" reaction

$TiCl_{4(g)} + Si_{(s)} \longrightarrow TiSi_{2(s)}, SiCl_{2(g)}$

where underlying Si from the substrate is consumed and an unstable product $SiCl_{2(g)}$ is formed, and a desired "no consumption" reaction

$TiCl_{4(g)} + SiH_{4(g)} \longrightarrow TiSi_{2(s)}, H2_{(g)}, HCl_{(g)}$

where hydrogen and hydrogen chloride come off as gases. Seebauer has shown that, with proper adjustment of temperature and pressure, the "no consumption" reaction dominates and consumption is minimized.

Work in both academic and industrial labs over the last 10 years, mainly by trial and error, has been devoted to this process but the "ideal characteristics" have never yet been satisfied. The Seebauer group has been able to modify the process for CVD of $TiSi_2$ so that it meets the following benchmarks: Temperatures are less than 750°C which limits dopant redistribution at the interface, and selectivity on Si versus SiO_2 is 100%. Consumption of substrate Si is 100Å or less, and the growth rate is more than 1000 Å/min. As Seebauer sums it up, "We've done it."

How did he do it? His group uses ultrahigh vacuum (UHV) surface science interfaced with CVD growth. The vacuum chamber is used to measure the rate constants for each step in the overall reaction mechanism, and to obtain information on the structure and composition of surfaces immediately before and after growth of the $TiSi_2$. In the vacuum chamber Seebauer can correlate the initial composition and structure of the substrate with subsequent nucleation properties to determine how the film starts growing. In the attached CVD chamber a microbalance having atomic layer sensitivity monitors the rate of film growth. In addition, a line-of-sight quadrupole mass spectrometer (QMS) monitors reactant conversions and the presence of any unstable products, such as the free radical $SiCl_2$. The experimental apparatus, shown in figure 2, was custom built. It is unique because of the specific way that the capabilities just described have been configured.

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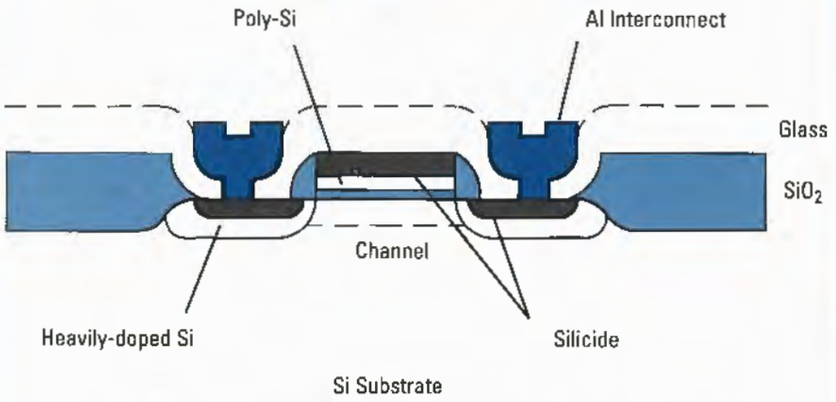

Figure 1. Schematic diagram of a metal-oxide-semiconductor-field-effect transistor (MOSFET). The entire device sits on a Si substrate. The source and drain regions consist of heavily-doped Si connected to Al interconnects through layers of silicide. The electrical current between these regions (through the channel) is controlled by the electrical potential placed on the gate region, consisting of polycrystalline Si and more silicide. This central silicide is also attached to an interconnect (not shown).

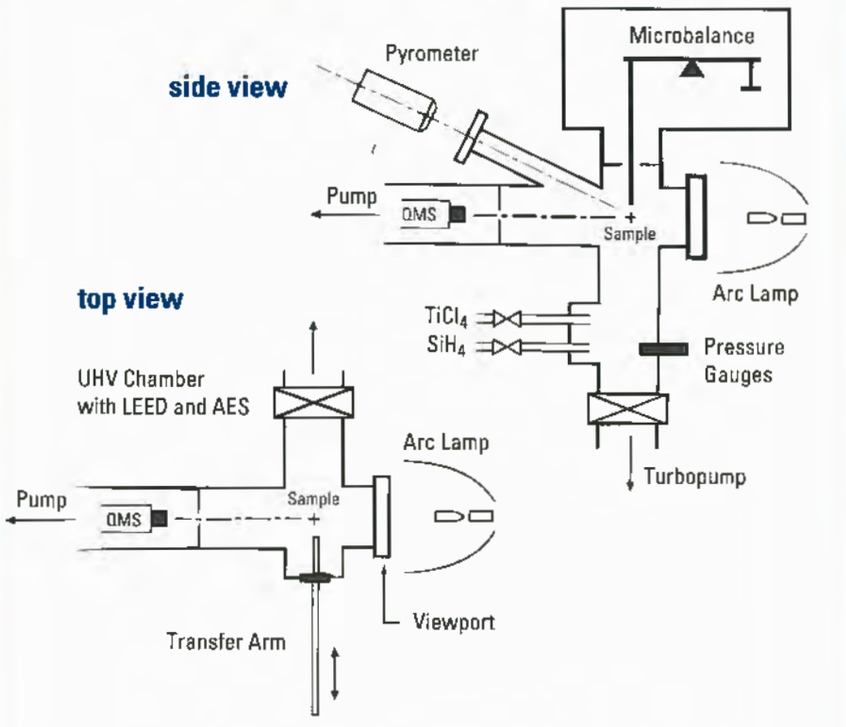

Figure 2. Two schematic views of the experimental apparatus, focusing on the deposition chamber. The ultrahigh vacuum (UHV) chamber is not shown directly, but has capabilities for measuring surface composition by Auger electron spectroscopy (AES) and low-energy electron diffraction (LEED). The top view looks along the axis between the microbalance and the sample. The side view looks along the axis of the transfer arm. The sample is heated with a focused arc lamp, and the temperature is monitored with the pyrometer.

Faculty Research

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Figure 3 shows the overall intellectual approach of the research, which is intended to yield predictive kinetic models for developing processes of value for the semiconductor industry. The tree, whose sturdy trunk represents the predictive model, is nourished by a complex root structure that encompasses, but is not limited to, results from experiments in the ultrahigh vacuum and chemical vapor deposition chambers, shown above.

The left side of the root structure represents the experimental and theoretical determination of rate constants for each step in the overall reaction mechanism, or the mechanistic kinetics of the system. These studies are based on a set of experiments that are performed in the UHV portion of the apparatus shown in Figure 2. In the particular case of $TiSi_2$, the mechanistic kinetics provide data on the adsorption of titanium tetrachloride and silane, and the desorption rates for each product in the process. These rates can be written in terms of surface concentrations hydrogen and chlorine, $TiCl_4$ and SiH_4 pressures, and temperature. Seebauer's combination of these rates permit him to write a general expression for the growth of silicide.

The mainstay method he uses to obtain the individual rates is Temperature-Programmed-Desorption (TPD). In this procedure, the surface of the sample is exposed to the gas of interest. Some gas adheres and the remainder is pumped away. The sample is moved in front of a mass spectrometer and heated so that the temperature is a linear function of time. As the gases desorb, the products can be observed with the mass spectrometer, resulting in a desorption spectrum.

Two major problems have long limited the application of TPD to addressing problems of practical interest. One problem with conventional TPD is that most practical surfaces are polycrystalline with highly variable surface structures and therefore display many desorption pathways. Consequently, many activation energies are represented in the experimental desorption spectra, invalidating conventional methods for quantitative analysis. The other problem is that conventional TPD fails to detect some product reactions when other products desorb at widely separated temperatures.

To solve the first problem, Seebauer has developed a mathematical framework for obtaining, without any guesswork or parameterization, the distribution of rate constants presented by a polycrystalline surface. Previous analytical methods were capable only of handling single rate constants from homogeneous single crystal surfaces.

To address the second problem, Seebauer has designed a new methodology known as Differential-Conversion-Temperature-Programmed-Desorption (DCTPD). A schematic of the methodology, showing how it can be used to locate a cross product between reactants, can be seen in figure 4.

Suppose that adsorbed H recombines to desorb as H_2 long before HCl has a chance to form. HCl formation can still be monitored as follows: The first step is to absorb a known Cl coverage using $TiCl_4$ at temperatures sufficiently low for Cl to stay on the surface but above where H_2 desorbs. The next step is to expose the surface to a weak beam of SiH_4 and to monitor the dsorption rate rHCl of cross product HCl with a mass spectrometer. The reaction is run just long enough to measure the cross product and is then shut off. This is followed by standard

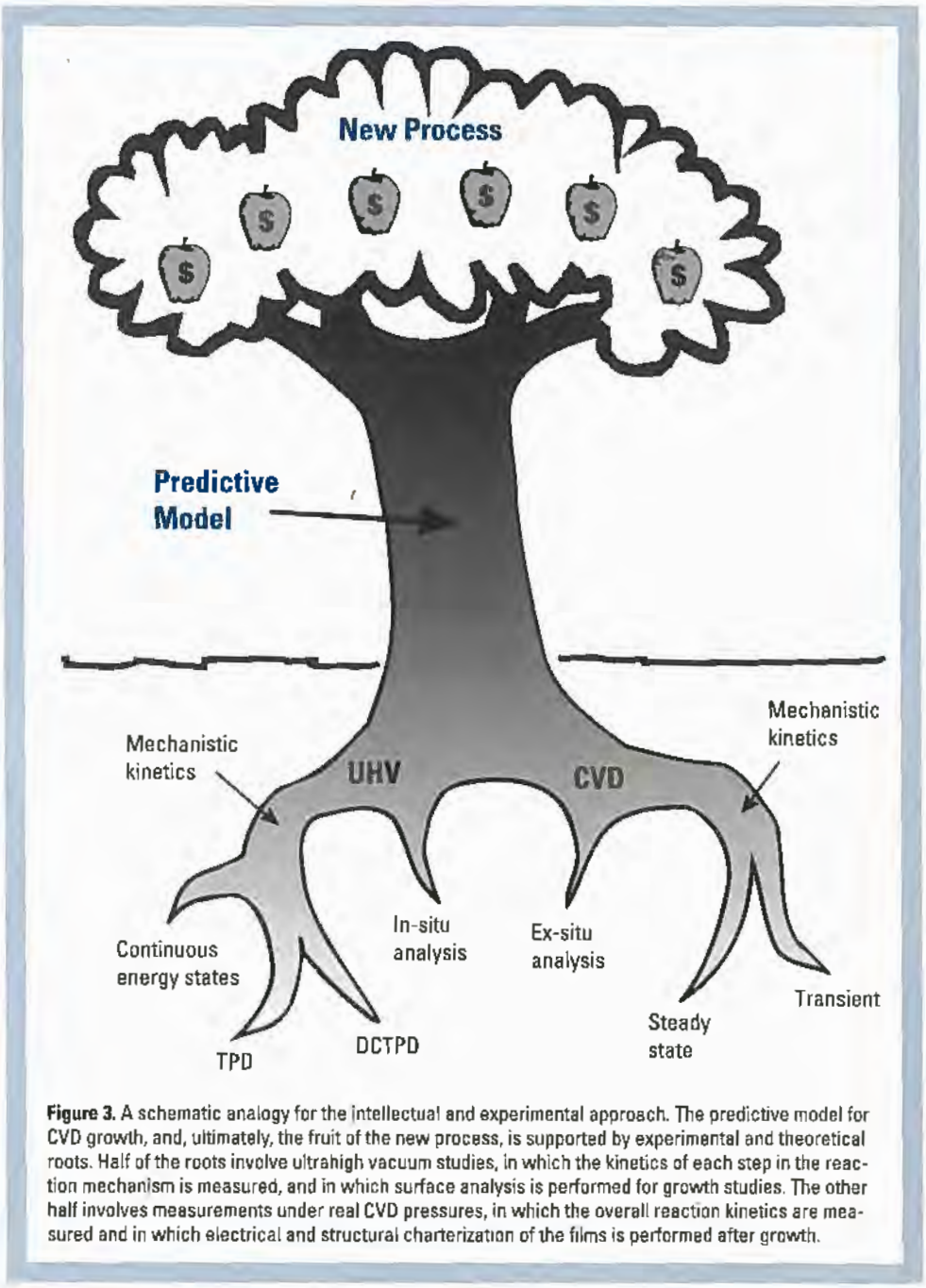

Figure 3. A schematic analogy for the intellectual and experimental approach. The predictive model for CVD growth, and, ultimately, the fruit of the new process, is supported by experimental and theoretical roots. Half of the roots involve ultrahigh vacuum studies, in which the kinetics of each step in the reaction mechanism is measured, and in which surface analysis is performed for growth studies. The other half involves measurements under real CVD pressures, in which the overall reaction kinetics are measured and in which electrical and structural charterization of the films is performed after growth.

Hager Elected to National Academy of Sciences

Lowell P. Hager, Professor of Biochemistry, has been elected to the National Academy of Sciences. He joins a distinguished list of former faculty in Biochemistry who have been members of the National Academy, Professors William Rose, Herbert Carter, I.C. Gunsalus, Gregorio Weber and Nelson Leonard.

Professor Hager is well known in the field of enzymology. Probably, his best known studies are in the area of biological halogenation and epoxidation reactions. Hager discovered chloroperoxidase, an enzyme that inserts halogen atoms into organic molecules. Chloroperoxidase is involved in the synthesis of antibiotics like chloramphenicol and aureomycin and serves as a model for the synthesis of thyroid hormone in mammalian systems. His group has purified the enzyme, crystallized it, and defined its mechanism of action. Currently, his lab is using chloroperoxidase in the synthesis of epoxides which can be used for chiral drug synthesis.

Another important field of Hager's research has been the study of pyruvic acid metabolism. As a graduate student in Professor I.C. Gunsalus' laboratory, Hager discovered lipoic dehydrogenase, a key component of the pyruvate dehydrogenase complex. Subsequently, Hager and his students have studied and characterized bacterial pyruvate oxidases which metabolize this important metabolic intermediate in new and unusual ways.

Professor Hager received his Ph.D. from the University of Illinois in 1953 and returned to join the chemistry faculty in 1960. From '67-'69 he was Head of the Biochemistry Division of the Chemistry Department. In 1970, he became the first Head of the newly created Biochemistry Department and remained in that post until '88. He served as Director of the U. of I. Biotechnology Center from '87 to '95.

Professor Lowell P. Hager

Faculty Research

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TPD of $SiCl_2$ to check for differential (i.e. minimal) conversion of surface Cl to HCl. Because most H desorbs as H_2, the surface concentration of hydrogen (H) can be calculated from the adsorption/desorption kinetics of H_2, which can be measured independently by standard TPD. This methodology enables Seebauer to calculate the rate constant k_{HCl} where $k_{HCl} = r_{HCl}/[H][Cl]$.

The invention of the DPTPD was a linchpin in the development of the predictive model which resulted in the new technology.

Unfortunately, the UHV experiments by themselves are not sufficient to develop a model. The right side of the root structure in Figure 3 is also needed. Kinetic experiments under actual CVD conditions are required to help guide the UHV experiments. Experiments done under steady-state and transient conditions offer different perspectives on the reaction. Ex-situ analysis of the grown films by x-ray diffraction, electron microscopy, electrical conductivity, and other methods also serve as feedback into the model.

Of course, as Seebauer points out, the model has not addressed many manufacturability questions yet, but you have to leave something for the future, even when you are a young man in a hurry. Seebauer has always been in a hurry. He received his BS degree from the U. of I. in '83 after only 3½ years of study. Yet he found time for participating in the Engineering Open House and was honored as a Knight of St. Pat. He completed his Ph.D. in '86 at the University of Minnesota less than four years later. As he said, "It was very cold which was a good incentive to finish quickly."

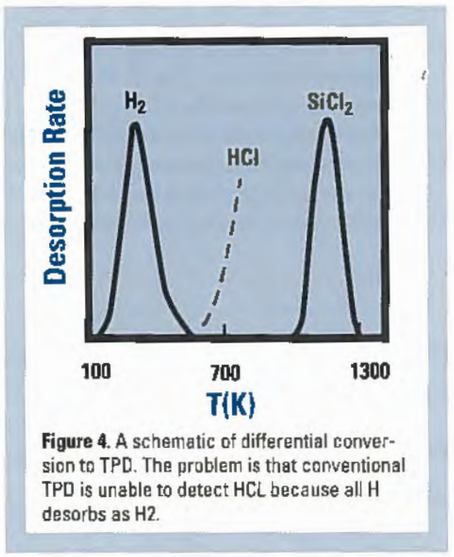


Figure 4. A schematic of differential conversion to TPD. The problem is that conventional TPD is unable to detect HCL because all H desorbs as H2.

He joined the chemical engineering faculty in January '88 and two months later received a Presidential Young Investigator (PYI) Award. He also received a Dow Teaching Excellence Award in '88 and a DuPont Young Faculty Award in '89. In '94 he received a Sloan Fellowship for diffusion studies. As an outstanding young scientist, he was invited to be an observer for the US Delegation at the International Union of Pure and Applied Chemistry General Assemblies in '89 and '91.

Rich Masel, Seebauer's colleague, describes Ed's work as "really neat". As he puts it, "Ed has used surface science techniques to study the fundamental chemistry of silicide formation. He then put what he had learned into a mathematical model and used the model to design a new chemical process. The process is currently being adopted by the semiconductor industry. To me, this is the leading edge of modern chemical engineering: fundamental science with immediate process applications and the use of modeling to design new materials. Ed has become one of the leaders in the use of surface science techniques to design new chemical processes. We are very lucky to have Ed here at Illinois."

Biochemistry Department Launches Carter Fellowship Drive

To mark the 25th anniversary of the establishment of the Biochemistry Department as a separate entity at the U. of I., the Department is organizing a drive to establish an endowment for its first named graduate fellowship. The fellowship will honor Professor Herbert E. Carter, one of the most distinguished members of the faculty whose superb achievements as a scientist, teacher, administrator, and statesman of science, helped to establish the excellent reputation that the department has earned.

Dr. Carter devoted 40 years to serving the University of Illinois. In 1931 he came to the university as an instructor and graduate student. He received a Ph.D. in organic chemistry with Professor Marvel in 1935 and remained to become a professor of biochemistry. From 1954 to 1967 he served as head of the department of chemistry and chemical engineering and from 1967 until his "retirement" in 1971 he served as the first vice chancellor for academic affairs. In 1971 he moved to the University of Arizona as head of the campus-wide biochemistry program and later as coordinator of their graduate program in interdisciplinary studies.

As a scientist, Professor Carter is best known for his research in complex lipids. His studies of cerebrosides and the long-chain base sphingosines have had significant implications for medicine as well as for agricultural and food chemistry. He has made important contributions to studies of many antibiotics, most notably streptomycin, endomysin, levomycin, filipin, chloramphenicol, streptothricin, and neomycin.

Dr. Herbert E. Carter

During WWII, he took part in cooperative studies in the biosynthesis of penicillins with various industrial laboratories.

Dr. Carter's scientific contributions have garnered a host of prizes and awards. He was elected to the National Academy of Sciences in 1953 and became a Fellow of the American Academy of Arts and Sciences in 1966. He won the Nichols Medal in 1965, the American Oil Chemists Award in Lipid Chemistry in 1966, and the Charles Spencer Award for Outstanding Achievement in Agricultural Chemistry in 1969. He received an Hon D.Sc. from DePauw University, his Alma Mater, in 1952 and another from the University of Illinois in 1974.

Professor Carter has been described as an "Enthusiastic statesman of science." He was active in the American Society of Biological Chemists and served as president in 1957. He made important contributions to the Committee on Professional Training of the American Chemical Society. As chairman from 1960-1965 he helped redefine educational requirements and developed instructional materials for junior college programs. He helped to found the ACS journal, *Biochemistry*. As co-founder of the ACS Committee on Chemistry and Public Affairs he spearheaded ACS involvement with national issues such as pollution and control of insects and rodents, and stimulated constructive interaction with members of Congress. He was active in the National Academy of Sciences and served as chairman of the Section of Biochemistry from 1963-1966.

At the request of the National Research Council Carter served as a member and later head of the US delegation to the International Union of Pure and Applied Chemistry and also served on the Food Protection Committee of the Council and chairman of the Subcommittee on Evaluation of Carcinogenic Hazards of Food Additives. As a member of the Advisory Committee on Eastern Europe, he helped open up scientific interaction between biochemists in the US and the USSR.

Dr. Charles Sweeley

Carter was appointed by President Lyndon B. Johnson to the National Science Board in 1964 and was reappointed by President Richard M. Nixon in 1970. In 1971 he was elected chairman. Carter also served on the President's Committee on the National Medal of Science from 1963-1966 and as chairman from 1965-1967.

The fellowship drive was initiated with a very generous lead gift from Dr. Mac H. McCormick, one of Dr. Carter's former students. His gift has been matched 2:1 by Eli Lilly and Company. Dr. Charles Sweeley, Professor Emeritus of Michigan State University, and one of Professor Carter's former students has agreed to serve as chairman.

For further information on the drive and methods of giving, please contact the following:

Ellen Handler
University of Illinois
505 S. Mathews
Urbana, IL 61801
Tel: 217-333-6083
Fax: 217-333-3120
e-mail: ehandler@uiuc.edu

Anyone wishing to send a check should make it out to UIF/Carter Fellowship Drive and send it to the above address or enclose in the pre-addressed envelope. To multiply your gift dollars, please include a company matching gift form if appropriate.

The Biochemistry Department's first named fellowship will honor Professor Herbert E. Carter, one of the most distinguished members of the faculty whose superb achievements as a scientist, teacher, administrator, and statesman of science, helped to establish the excellent reputation that the department has earned.

A Scholarship is a Tie That Binds the Generations

Peter and Gretchen Miller Markunas should know. The scholarship that they established for an undergraduate chemistry student is the third scholarship they have set up at the U. of I., each in honor of a beloved family member. They did it because "we know that getting an education is expensive and difficult, and we wanted to help someone else to get a good education as we did. It was easier to do when we received 2 for 1 matching gifts from R. J. Reynolds Company but even without that help we will try to continue. We want to see our money put to good use and to give back something for all we received. It is a good way for us to express our appreciation and gratitude."

Both Gretchen and Peter worked hard to obtain their education. Peter attended Shurtleff College in Alton IL where he waited tables and swept floors to put himself through school and learned what it means to get an education. When he graduated, he realized that he needed further education to become a chemist and therefore came to the U. of I., where he obtained a teaching assistantship at the invitation of Professor Bailar. In 1940 he completed his Ph.D. degree under the supervision of Professor Reedy.

Soon after graduation, Peter went to Commercial Solvents Corporation in Terre Haute, IN, to take charge of the corporation's analytical department. During the war years, Peter worked on the antibiotics penicillin and bacitracin. In 1951, Peter moved to R. J. Reynolds Company to head up their analytical division. When he came, the company was just beginning its research initiative. When he left in 1972, the department had expanded significantly. After his retirement, the Markunases moved to Springfield, IL and have become active U. of I. alumni.

Gretchen too remembers going to college during the depression. She attended what was then Illinois State Normal University in Normal, IL and received a teaching degree. She took a position at a rural school and returned every summer to work towards her bachelor's degree. She has very pleasant memories of her summer school years. However, she got her "bachelor" before she finished her "bachelor degree" and therefore did not complete her course of study.

Mrs. Gretchen Miller Markunas, Lance Pfeifer and Dr. Peter Miller Markunas

They both enjoy following the careers of their scholarship winners. Lance Pfeifer, the first chemistry student recipient is now working towards a Ph.D. at the University of Indiana and doing very well. Lance did not realize how good his preparation at the U. of I. had been until he began graduate studies. He gives a great deal of credit to Professors Peter Beak and Steve Zumdahl who helped him to get the most out of his opportunities at the U. of I. and to make the decision to continue his studies after graduation.

Lance really appreciated the financial support he received from the Markunas scholarship but he is even more grateful that he had "an opportunity to meet a respected professional like Peter Markunas at a personal level." He said, "I have never forgotten Peter Markunas's advice. He said to me, 'Just as you have been given the monetary means to complete your education, you should make sure that when you have the means you'll give something back.' And I plan to."

The U. of I. is deeply grateful for the scholarships that the Markunases have established, and the Markunases enjoy keeping in touch with their scholarship recipients. If their health permits, they will try to return to the U. of I. soon to meet the current holders of their scholarships in person.

Bailar Fellowship Drive Concludes Successfully

Thanks to the generosity of colleagues and friends of John Bailar, the chemistry department will offer the first Bailar Fellowships in the Fall of 1995. The drive has been very successful. As of the close of 1994, we had raised over $232,000 in gifts, pledges, and written promises toward our ambitious goal of $250,000. We are very grateful to our 280 donors, several of whom have already made multiple gifts. Special thanks are due our major contributors whose names will be recorded permanently on a plaque on display in our new building. These donors will receive a letter regarding the wording of their names. Please contact Ellen Handler at the School of Chemical Science if you think you should have been included but did not receive a letter.

The success of the Bailar Fellowship Drive is an eloquent testimonial to a truly exceptional man. One of our contributors commented that although he had known John Bailar only very slightly, he had decided to support the drive because he was deeply impressed with the admiration and affection that John Bailar had inspired in his students. To illustrate the point, he described a former Bailar student who always kept a photo of John Bailar on his desk alongside those of his family. As the donor put it, "There aren't many professors whose students admire them enough to keep a photo of them on their desk. He must have been a very special man, and there aren't many like him. I am only sorry that the students who will receive the fellowship will not have the opportunity to know John Bailar personally. He would have been an inspiration to them."

Professor John Bailar

We will take great pride in our inaugural Bailar Fellows. If the fund meets its full goal in the future, we expect to honor five graduate students annually with that designation.

We Salute Outstan

Kirk Kolenbrander

Martha Schlicher

Kirk Kolenbrander, Ph.D. '88

Seven years after graduation, Kirk is an associate professor in the Department of Materials Science and Engineering at the Massachusetts Institute of Technology. He is quick to point out that tenure is yet to come, hopefully in the next two years.

Kirk has been able to combine his training in physical chemistry techniques with his interest in material science. At the U. of I. he completed his Ph.D. under the direction of Professor James Lisy and then spent two years in a postdoctoral program at AT&T Bell Labs. As a postdoc, he was able to apply to small semiconductor systems the gas phase techniques and laser spectroscopy he worked with as a graduate student.

Since coming to MIT in 1990, his research has focused on the synthesis and processing of new materials containing semiconductor nanocrystallite "quantum dots". These semiconductor heterostructures represent a new class of materials to serve as a simultaneous materials platform for microelectronic, optoelectronic and photonic applications. Today's microelectronics platform of choice, silicon, cannot be used as a light emitter, and therefore cannot be used with tomorrow's hybrid electronic/photonic systems. With his techniques, Kirk hopes to develop a material that looks, feels and processes like silicon but that is also a high performance light emitter. His work pushes the frontiers of today's microelectronics into new areas, and he was recognized in 1992 with a Young Investigator Award from the National Science Foundation.

David Post

Kirk said, "The chemistry department at Illinois gave me 4 1/2 wonderful years that allowed me to go to Bell Labs well prepared in the fundamentals of physical chemistry. Since then, I have been able to take those fundamentals and use them to stretch the boundaries of materials science and engineering to include our synthesis and processing of unique materials."

"I have always enjoyed a great deal of respect for my education at the U. of I. Both the university and the chemistry department are world-renown. I am proud to be one of the community of Ph.D.'s the world over who have earned their degrees from the School of Chemical Sciences at the University of Illinois."

David Post, Ph.D. '91

Last year David Post won the Scientist of the Year Award for Discovery from the Chemical and Agricultural Products Division of Abbott Laboratories. He was chosen for his work on strain improvement for fermentation of erythromycin. Since coming to Abbott three years ago, David has introduced genetic engineering techniques, using molecular biology, with excellent results for productivity. He acknowledges the prior efforts of the Strain Improvement Department, which had been experimenting with fermentation of erythromycin for about 50 years. Their approach had been to select among the strains produced by random mutations. His contribution was to use molecular biology to direct the mutation process, to make it more specific and precise, and, ultimately, more productive. As he said, "You have to be able to figure out what you want to change and to have the tools to make the changes" and he had both.

He credits his success at Abbott to his training in enzymology and molecular biology under the supervision of his advisor, Robert Switzer. He also feels that he owes his job to the network of students in the Switzer group. A former graduate student from the group encouraged Abbott to offer him a position. He is now well established as a principal investigator with two technicians and plans to stay.

Looking back at his graduate education, David said that it offered "not only an excellent learning environment but also the opportunity to meet many outstanding and interesting people." He also commended the work of the placement services both at the School and at the Biotechnology Center. Even though neither resulted in a job offer, both gave him valuable experience in job hunting and interviewing.

Martha Schlicher, Ph.D. '88

Martha firmly believes that you don't become successful by making that your goal. Rather, success is a bi-product of doing a good job. It has worked for her. In the six years since graduation, she has risen through the ranks at Monsanto, taken part in a reorganization of the agricultural new

ding Young Alumni

product development unit and has emerged as Director of the unit's Environmental Sciences Department.

Her department of about 50 people supports existing products and develops new ones. They work closely with other technical departments to deliver product and product information necessary for EPA review and approval. This role includes environmental stewardship to ensure that new products are environmentally friendly and, once registered, are supported, should an environmental emergency arise, such as a fire or spill.

In addition to her technical and managerial responsibilities, Martha has been deeply involved with the Monsanto funded Illinois outreach program. The objective of this program is to develop relationships and provide support to those schools that are key to their recruitment efforts. At Illinois, they support topical conferences in organic chemistry and sponsor the annual Allerton conference in biochemistry. They sponsor student internships and bring university students to Monsanto for two-day science programs.

Martha gives considerable credit to her colleagues and mentors at Monsanto and at the U. of I., especially to Bob Coates, her advisor, who provided excellent leadership and counsel throughout her graduate studies. Her experience at the U. of I., with its focus on fundamentals, has proved invaluable. She also thinks that the teaching requirement was very helpful in reinforcing core skills and a "teaching/coaching mentality" that has transferred well into management. Her experience at Illinois convinced her that "people don't walk on water but succeed through hard work and dedication."

Martha feels fortunate to have a position in the technical interface which she considers the most exciting part of the company. It provides multiple opportunities for making a significant contribution, gives her a significant part in development of new products and helps her hone her business skills. Her success at Monsanto has been phenomenal. One of her mentors pointed out that she is the youngest director in the history of the company, moving on a very fast track, and the only woman technical director ever appointed.

David Bernlohr

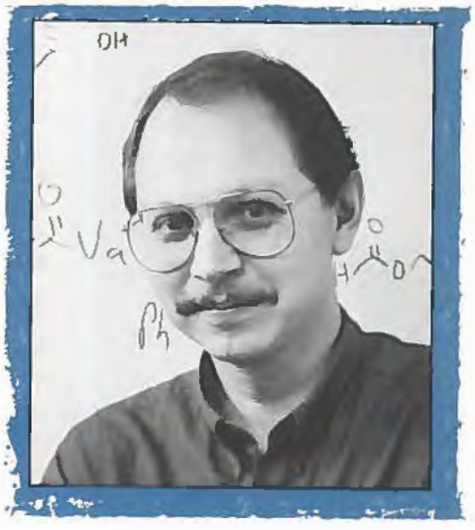
David Bernlohr, Ph.D. '82

Nine years after joining the Biochemistry Department at the University of Minnesota, David Bernlohr has recently been promoted to the rank of full professor. His position at Minnesota followed a postdoc at the Johns Hopkins School of Medicine in Baltimore where David worked with Professor M. Daniel Lane. David had met Dr. Lane at the U. of I. previously when Dr. Lane received a William C. Rose Award. The award was set up by friends and students of Professor Rose and was the occasion of the fateful meeting.

At Johns Hopkins, David began his studies on the relationship between obesity and insulin resistance. After moving to Minnesota, David continued this line of research and discovered a protein in human fat cells that transfers lipids inside adipose cells. He now pursues a variety of research projects related to fat cell metabolism involving molecular biology and protein chemistry. The topic is important because obesity is a growing problem in the United States and the correlation with diabetes is high, especially among older Americans.

David's research has received recoguition with a PYI Award in '86 and a Fred Goetz Award in diabetes research in 1990, given by the Minnesota affiliate of the American Diabetes Association. Funding for his research has come from the National Institutes of Health, the National Science Foundation, the American Cancer Society, the Juvenile Diabetes Association, and the American Diabetes Association.

John Hoots



Dale Kempf

Looking back, David has many fond memories of his years at the University of Illinois where he worked with Professor Robert Switzer. He reports that the U. of I. biochemistry department has an excellent reputation and he refers many of his students to us for graduate work. As he says, "Illinois is a very special place. It has an excellent faculty and I especially appreciate the many opportunities that Dr. Switzer gave me. He created an environment where it was enjoyable to go into the lab and work. We never used to talk about how hard it was to do an experiment. We found that experiments were fun to do and we learned never to be afraid to try a new one."

Continued on page 12

Alumni News

1940

Ernest L. Eliel, Ph.D. '48 (Chemistry with Snyder) has received the 1995 George C. Pimentel Award in Chemical Education from the ACS. He is W.R. Kenan Jr. Professor Emeritus at the University of North Carolina, Chapel Hill, NC.

Dorothy Martin Simon, Ph.D. '45 (Chemistry with Clark) was honored by her high school as an outstanding alumna. She gained an international reputation in the field of combustion while working for the Lewis Laboratory of NASA and as a research scientist for the DuPont Company and for the Atomic Energy Commission. She was Director of Crown Zellerbach Corporation from '78-'85.

1950

Len Afremow, B.S. '58 (Chemistry) has retired as Vice President R&D/Purchasing from the Packing Products Division of the Dexter Corporation. He received an MS in Chemistry from the University of Wisconsin and an MBA from the Executive Program at the University of Chicago.

Frederick H. Owens, Ph.D. '58 (Chemistry with Leonard) has retired from Rohm & Haas where he had been manager of information systems. Since his retirement he has consulted for the ACS and written a book with several co-authors. In acknowledgment of his contribution to K-12 science education, Rohm & Haas has established a scholarship at Chestnut Hill College named the Dr. Frederick H. Owens Scholarship in Chemistry Education.

Robert Putnam, Ph.D. '53 (Chemistry with Snyder) has retired twice. In 1985 he retired as manager for fluoropolymers research at DuPont in Parkersburg, W.Va. In 1993 he retired as adjunct faculty member in the chemistry department at Washington State Community College in Marietta, OH.

Robert L. Wixom, Ph.D. '52 (Biochemistry with Rose) has retired from the University of Missouri after 40 years as a member of the biochemistry faculty.

Alumni News continues on the next page

Salute to Young Alumni

from page 11

John Hoots, Ph.D. '84

In the 10 years since completing his Ph.D. with Professor Thomas Rauchfuss, John Hoots has moved rapidly through the ranks in the Water and Waste Treatment Division of Nalco Chemical Co. Last June, John was promoted to Research Associate, the second highest rank in the company's technical track.

According to the company's official news release, "John was the driving force for the original introduction of fluorescent tracers into cooling water programs and has been the champion of TRASAR® Technology ever since. Today, TRASAR® is an important global product platform at Nalco as a result of his commitment and unrelenting dedication to this technology." John has also helped develop Nalco's PRISM® Technology which is a scale inhibitor and dispersant and keeps customers' water treatment systems running efficiently.

John is one of only three members of the Gold recognition level in the Nalco Patent Hall of Fame, with 29 patents covering the major areas of technology on which he has worked. He is author or co-author of more than 20 publications and technical presentations, is a two-time winner of the Cooling Water Department Researcher of the Year award, and received a Chairman's Technical Achievement Award in 1989.

John gives a great deal of credit for his success at Nalco to his work at the U. of I. where he learned the basics of how to carry out an independent research project successfully. As a result of his positive experience here, he returns on annual recruiting trips to the campus. He has been impressed with the quality of our graduates and finds at least one or two every year whom he recommends for plant trips.

The work has been hard but the rewards have been satisfying. The company recognizes John's "extraordinary sense of dedication, enthusiasm, and creativity." Perhaps we will hear in the future that John has been named Research Fellow, the top rank on the technical ladder, a position that has been held by only one person in the history of the company - to date.

Dale Kempf Ph.D. '82

As a medicinal chemist in the Pharmaceutical Products Division of Abbott Laboratories, Dale Kempf is a member of a team that has designed and developed ABT-S38, a promising investigational AIDS drug. ABT-538 is a potent inhibitor of HIV protease and has been proven effective when administered orally to human subjects. Dale's role in this large, interdisciplinary team is the design and synthesis of new inhibitor molecules. Because of the complex nature of drug development, the group draws on information from X-ray crystallography, pharmacokinetic, virological studies, computer modeling, and many other fields to understand the complex relationship of chemical structure and biological activity.

Dale began his career at Abbott in 1984. He initially worked on the design of inhibitors of renin, an enzyme involved in cardiovascular regulation. In 1989 he moved into the Anti-Infective Division to begin work on inhibitors of HIV protease, an essential enzyme for the HIV replication cycle. He and his colleagues pioneered a new approach to inhibitor design based on the three-dimensional structure of the enzyme active site. Through an understanding of the structural basis for diverse biological effects such as antiviral activity, oral pharmacokinetics and hepatic metabolism, ABT-538, now in clinical trials in AIDS patients, was discovered.

His work has already received recognition both within Abbott and beyond. Dale has twice won a Chairman's Award at the company. He has published extensively and been invited to present numerous scientific lectures. Last year, he was appointed to the position of Research Fellow in recognition of his scientific excellence.

In his graduate education at the U. of I., Dale learned not only the synthetic chemical techniques that are primary for his work but also "the ability to think critically and creatively as a scientist," which he considers as important as any other training. These tools have enabled him to "ask the right questions and design the right experiments." He describes his Ph.D. advisor, Professor Peter Beak, as "a very astute scientist, whose mechanistic approach prepared me well for the challenges of multidisciplinary research. He continues to be a mentor and personal friend in his role as a consultant at Abbott." In addition, Dale gained valuable experience in his two years as a postdoc at Columbia University. As he said, "The experience of proving myself as a scientist in a new environment gave me additional confidence which benefited me greatly in beginning a career at Abbott."

Recollections of "Summer Preps"

by John C. Robinson, Ph.D. '43

John C. Robinson, Ph.D.

It was during the summer of 1940 that I was assistant prep boss. Professor Rose was in the midst of his studies of the essentiality and the adequacy of some 20 or 21 amino acids. A number of these amino acids or the intermediates en route were made in the summer preps.

One of the intermediates was a first cousin to a mustard gas, chloroethyl methyl sulfide, if my memory is right. Addison (not his real name) was in charge. He had completed all the necessary steps to produce the pseudo-mustard product and now had to extract it from the reaction mixture with chloroform or carbon tetrachloride, dry the extract, distill off the $CHCl_3$ or CCl_4 and then vacuum distill the sulfide intermediate. Even though this material had a high boiling point, even under a vacuum, it was a bad actor and the whole procedure was done in a hood.

Addison had distilled off the solvent and, in removing the receiver from the fraction cutter, he somehow cracked it and a small amount of the solvent distillate spurted out and hit the top of his trousers. Within a minute or two he was in the lavatory, washing his clothes and himself with copious amounts of soapy water. But even though the mount of the highboiling intermediate in the low boiling solvent forerun was insignificant, it was more than enough to cause trouble. By midnight, Addison knew he needed help. He had begun to blister, just a tad, but painfully.

My friend spent the next two or three weeks of a hot Illinois summer (no air conditioning in those days) in a Carle Hospital bed under a sheet draped like a tent with some sort of a heat lamp at its apex. The final medical procedure was performed some weeks later - a circumcision.

For at least the next two years of summer preps, chroloethyl methyl sulfide (I believe that that was the pseudo mustard gas) was called the "Addison Memorial Intermediate."

Faculty/Staff Honors

William Pirkle, Professor of Chemistry, has received The 1994 Chirality Medal, for his distinguished contributions in the field of chemical chirality, especially the invention of the widely known Pirkle columns for chiral separations. The award was presented at the International Symposium on Chiral Discrimination organized by the Swedish Academy of Pharmaceutical Sciences.

Steven Zimmerman, Professor of Chemistry, has received the 1995 Buck-Whitney Award, given by the Eastern New York Section of the American Chemical Society. The citation read, "For excellence in the development of new approaches to self-assembled molecular systems in the field of bioorganic chemistry."

John Katzenellenbogen, Professor of Chemistry has received the 1995 Paul C. Aebersold Award for Outstanding Achievement in Basic Science Applied to Nuclear Medicine from the Society of Nuclear Medicine.

Martin Gruebele, Professor of Chemistry, has received a 1994 National Science Young Investigator Award from the National Science Foundation.

Eric Oldfield, Professor of Chemistry, has been awarded the 1994 Royal Society of Chemistry Award in Spectroscopy, for his work in nuclear maguetic resonance.

James Lisy, Professor of Chemistry, has been appointed to the American Chemical Society Petroleum Research Fund Advisory Board for a three-year term.

Louise Cox, Assistant to the Head of Biochemistry, has received a 1995 Academic Professional Award from the College of Liberal Arts and Sciences.

Leo Ochs, a plumber who works exclusively for the School of Chemical Sciences, has won a 1995 Chancellor's Distinguished Staff Award.

To reach your editor...

Thanks to modern technology, you can now reach our office by e-mail at scsnews@uiuc.edu and by FAX directly at 217-333-3120. Please continue to send your news and also include comments on the newsletter, alumni and development programs and any questions you may heve on eny of the above. We enjoy hearing from you.

Alumni News

Tin Boo Yee, Ph.D. '54 (Chemistry with Andrews) retired from the Redstone Arsenal in Huntsville, AL. He was very well known for his proficiency in growing flowers. In 1984 he received a patent for his invention for using synthetic fiber to repair shoe heels.

1960

Marcetta York Darensbourg, Ph.D. '67 (Chemistry with Brown) received the 1995 ACS Award for Distinguished Service in the Advancement of Inorganic Chemistry. She is professor of chemistry at Texas A&M University, College Station, TX. In '86 she received a Distinguished Teaching Award from Texas A&M.

H. Scott Fogler, B.S. '62 (Chemical Engineering) has been elected a director of the American Institute of Chemical Engineers. Dr. Fogler is Vennema Professor of Chemical Engineering at the University of Michigan in Ann Arbor.

Kenneth W. Freer, B.S. '67 (Chemistry) is Director of Operations at Environmental Products and Services, Inc. in Syracuse, NY. He is the 1995 Chairman of the Syracuse Section of the ACS. He received a master's degree in 1976 and hes been certified by the Board of Certified Safety Professionals.

Sheldon Kramer, B.S. '60 (Chemical Engineering) has started a new career as engineering supervisor at Bechtel Corporation after 27 years of service with Amoco.

Charles Lair, Ph.D. '67 (Chemistry with Curtin) has been recognized with 3M's highest technical honor, election to the Carlton Society. He is a Division Scientist at 3M.

Siao F. Sun, Ph.D. '62 (Chemistry with Van Holde) has completed a text *Physical Chemistry of Macromolecules,* published by the Interscience division of John Wiley & Sons. He has officially retired from the Department of Chemistry et St. John's University in New York but is still teaching.

Alumni News continues on the next page

Alumni News

1970

Milton L. Cofield, Ph.D. '79 (Chemistry with Belford) is assistant to the president for planning and special projects at SUNY in Brockport and has been appointed interim director of the college's Equal Opportunity Center.

William Collins, B.S. '79 (Chemistry) has been appointed to the chemical engineering faculty at Howard University in Washington, D.C. He received his Ph.D. at the University of Wisconsin/Madison.

Michael A. Fury, Ph.D. '78 (Chemistry with J. Jonas) is director of research for Rippey Corporation in El Dorado Hills, CA. The company develops and supplies chemical slurries and polishing pads to the semiconductor manufacturing industry for use in Chemical-Mechanical Polishing (CMP) for device planarization.

Robert Lamb, Ph.D. '75 (Chemistry with Natush) has been appointed to the Eleanor H. and Robert W. Biggs Chair in Chemistry at Ohio Northern University for the 1994-95 academic year. Dr. Lamb is a professor of chemistry and has been with Northern Ohio University since 1978.

Terence M. Lenhardt, M.S. '75 (Chemistry with Belford) is a physician at the Arnot Ogden Medical Center in Elmira, NY. He received his MD degree from U. of Cal/San Diego and a Ph.D. from UCLA.

Gary A. Magee, B.S. '78 (Chemistry) is an anesthesiologist at EHS Good Shepherd Hospital and a Fellow of the American College of Pain Medicine. He received his MD degree from the U. of I.

David L. Monts, B.S. '73 (Chemistry) has been promoted to associate professor with tenure at the Department of Physics and Astronomy of Mississippi State University. Dr. Monts holds a joint appointment in the Diagnostic Instrumentation and Analysis Laboratory.

James Munroe, M.S. '72 (Chemistry) has been installed president of the American Society of Brewing Chemists. He is with Anheuser-Busch in the Brewing Technical Services Department.

Alumni News continues on the next page

Dreyfus Grant to Upgrade Undergrad ChemE Instruction

Richard Braatz of our Chemical Engineering faculty has received a grant from the Camille and Henry Dreyfus Foundation to design an experiment for the process controls laboratory. The effort is part of an ambitious plan to renovate the entire undergraduate instructional program as part of the ChemE 2000 campaign.

Existing experiments in the process control lab are generally of two types: very simple experiments that teach the most basic principles, and multivariable experiments that demonstrate the complexity of problems but do not teach students how to solve mutivariable control problems in an efficient and effective manner. Braatz is designing a pH neutralization experiment for undergraduate study to teach multivariate process control. He has chosen this topic because (1) pH neutralization processes are industrially relevant, (2) the process is notorious for its severe nonlinearity, and (3) many pH neutralization mixing schemes can be investigated by a simple reconfiguration of the piping.

Braatz hopes that this will be the first in a series of new control experiments that will be realistic, reliable, and not too complicated and therefore suitable for undergraduate instruction. About 50 students per semester will be taught in this laboratory, which is required of all chemical engineering students. Both the unit operations lab and the senior projects lab will also be upgraded as part of the long range chemical engineering master plan.

Dr. William Rutter

Former Professor Honored by U. of I.

Dr. William Rutter, Professor of Biochemistry 1955-1965 and currently Chairman of Chiron Corporation, received an honorary D.Sc. degree from the U. of I. at its May commencement. In 1981 Rutter and two colleagues established the Chiron Corporation, today one of the most successful biotechnology companies in the world.

According to David Baltimore, Ivan R. Cottrell Professor of Molecular Biology and Immunology, Massachusetts Institute of Technology, "Many other prominent molecular biologists were the driving forces behind companies, but Bill was the only one who was successful on a large scale. Rarer still, Bill has been the only university biologist-CEO who is treated with respect by the business community." Dr. Rutter received his Ph.D. from the U. of I. in Dairy Science and has been outstandingly successful in building the Biochemistry Department at the University of California/San Francisco.

Chem Major President Alum Association

Jennifer Sherlock, a junior majoring in chemistry, has been elected president of the U. of I. Student Alumni Association (SAA). It is a big job. She will oversee all programming of the Association, including annual Homecoming activities, a banquet honoring the 100 top seniors, a siblings day and a commencement breakfast for graduates and their families.

In addition to spending several hours daily in the SAA office, Jennifer is carrying a full academic load as a pre-med student and maintains a grade point average greater than 4.6 (out of 5.0). She has been involved with student alumni activities since entering the U. of I. During high school in Godfrey, IL she worked on homecoming events and on the student council.

Jennifer hopes that chemistry alums will take part in Homecoming this year. The event is scheduled for October 28 in conjunction with the Illinois-Northwestern game. Please let us know if you're planning to come so that we can meet you in person and show you around.

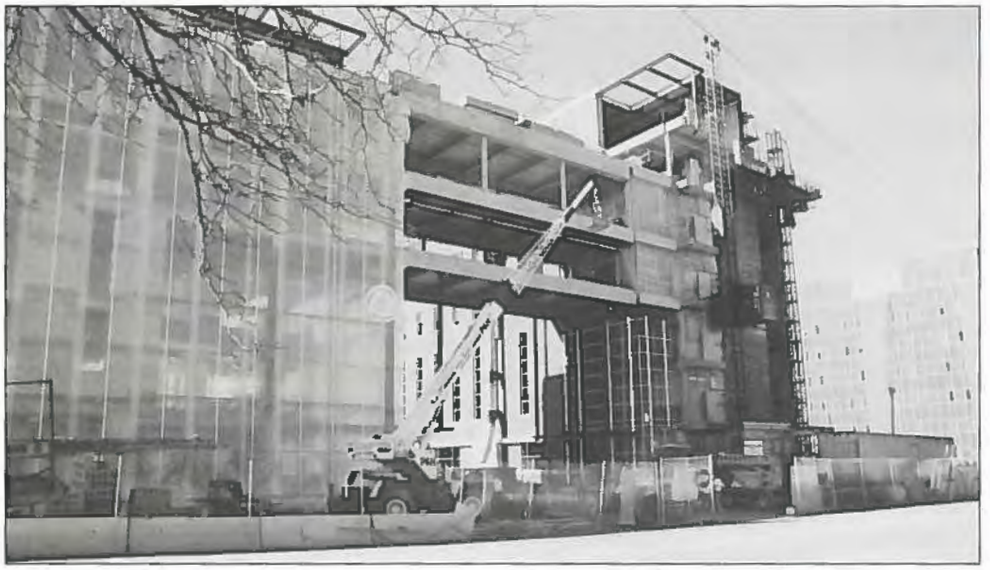


Photo of the new Chemical and Life Science Laboratory taken last February.

FACILITIES UPDATE

by Denton Brown, Assoc. Dir.

Since East Central Illinois has had a very mild winter, progress on the new Chem/ Life Sciences building has been excellent. The project is 64% completed as of March 1, 1995. The Chemical Science part of the project is protected with an innovative plastic covering on the outside, which has permitted the contractors to continue working even in the coldest weather. As of now, most of the concrete block walls are in place, and rough-in utility mains and ventilation duct work are nearly finished. Excellent weather has permitted the builders to recover some lost time. They are now predicting completion in the coming December. Research groups in Noyes Lab are preparing for the move.

The School's various renovation projects are showing signs of life. We have awarded three million dollars in contracts to replace two biochemistry teaching labs, one organic chemistry teaching lab, and one classroom. The asbestos removal crews are already hard at work. The project also includes a new elevator, two restrooms, and a handicapped entrance for the building. These projects in Noyes Lab will be completed by December of 1995.

The remodeling of one large teaching lab in Chemistry Annex is currently out for bid. This nearly one million dollar project will start in May '95 and will be completed by December '95. The good news is that this teaching lab will be a model facility within which general chemistry will be taught, with a full computer interface at each student's fingertips. The bad news is that we have funding for only one of the four labs which are needed. Of course, the same can be said for Noyes Lab where two major teaching labs, for organic and inorganic chemistry, are also waiting for funding.

Various projects in Roger Adams Lab are under way. The design of a two thousand square foot renovation on the third floor in Biochemistry is nearly completed. Construction should start early this summer. Classroom 116 will be remodeled next year with state funding. The design will include a much needed air conditioning system.

The good news is that the renovated teaching lab will be a model facility within which general chemistry will be taught, with a full computer interface at each student's fingertips. The bad news is that we have funding for only one of the four labs which are needed.

The Department of Chemical Engineering continues to push forward with designs for remodeling their major undergraduate student labs. This effort is completely funded by the Department, thanks to the generosity of alumni and corporate donors, and should begin early in 1996. The Roger Adams High Bay, the unit operations lab, will have a completely new look. As a result of scaling down the size of experiments, the unit operations lab will be reduced to a single story space. This creates new space to consolidate the undergraduate instructional program.

Alumni News

David A. Rivera, B.S. '75 (Chemistry) was the keynote speaker at the 7th National Patient Education Conference-Patient and Community Education. Dr. Rivera obtained his MD from the U. of I. in '79 and is chief of OB/GYN at Blue Care Network-Health Central in Lansing, MI.

David Sikkenga, Ph.D. '76 (Chemistry with Pirkle) was recently honored by Amoco Chemical Co. for receiving his 20th US patent. Dr. Sikkenga is a research associate chemist at Amoco.

Elizabeth Stanley, Ph.D. '72 (Chemistry with Malmstadt) is Director of Institutional Research and an adjunct assistent professor of education at Iowa State University.

Bruce Steffens, B.S. '71 (Chemistry) has been awarded membership in The American College of Physician Executives. He is Medical Director, Heritage National Healthplan for Family Care Affiliates in Moline, IL. He received his MD degree from the U. of I. in '75.

1980

Jayantha Amarasekera, Ph.D. '89 (Chemistry with Rauchfuss) has accepted a position as research chemist with BASF Corporation et their Wyandotte, MI site. Prior to joining BASF in '92, Dr. Amarasekera was a research associate with Professor T.J. Pinnavaria in chemistry at Michigan State University.

Lynn Buhr (Ciabattari), B.S. '88 (Chemistry) is a senior chemist for Nalco Chemical Company in Naperville, IL.

Lara Dennis, B.S. '89 (Chemistry) is a resident in radiology at William Beaumont Hospitals in Royal Oak, MI. Dr. Dennis received her MD degree from the U. of I. in '93.

John Also DeMattei, B.S. '87 (Chemistry) has completed his Ph.D. in chemistry at UCLA. He is doing postdoctoral research at Harvard University.

Mark H. Fishbein, B.S. '81 (Chemistry) is a physician at Childrens Hospital in Columbus, OH. He received his MD degree from the U. of I. in 1985 and was elected to fellowship in the American Acedemy of Pediatrics in 1994.

Alumni News continues on the next page

Alumni News

Christopher L. Gleason, B.S. '87 (Chemistry) is currently a faculty member at the MacNeal Family Practice Residency Program in Berwyn, IL. He received his MD degree from the U. of I.

Timothy Henly, Ph.D. '88 (Chemistry with J. Shapley) is an "R & D Scientist" with Ethyl Corporation in Richmond, VA.

Scott G. Hoffert, B.S. '88 (Chemistry) has accepted a position as Complience Coordinator at SMX Environmental Monitoring Laboratories Inc. in Geneva, IL.

Dr. Kris Jenner, B.S. '84 (Chemistry) has received a Mascoutah Achievement Award from the Belleville Elks Lodge. He received a Ph.D. from Oxford University and an MD from Johns Hopkins Medical School in 1993.

Narhe Lee, B.S. '84 (Chemistry) has successfully completed her board certification and has been named a diplomate of the American Board of Surgery. She received her MD degree from the U. of I. and completed a residency at Northwestern University Medical Center.

Michael C. Liu, B.S. '89 (Chemistry) received his MD degree from Mayo Medical School in Rochester, MN in 1994.

Shi-Yi Liu, Ph.D. '87 (Chemistry with Dykstra) is principal chemist with CAChe Scientific, Inc. in Beaverton, OR.

Steven Lukancic, B.S. '83 (Chemistry) is a radiologist on the staff of St. Margaret's Hospitel in Spring Valley and Illinois Valley Community College in Peru, Illinois. He is board certified in diagnostic radiology and is a member of the American Board of Radiology. Dr. Lukanic received his MD degree from the U. of I. College of Medicine.

Brian S. Mitchell, B.S. '86 (Chemical Engineering) has accepted a position as Assistant Professor of Chemical Engineering at Tulane University

Ruth A. Patterson, B.S. '86 (Chemical Engineering) has received an M.S. in accounting and passed the C.P.A. exam in Nov. '94. She is currently employed by The Quaker Oats Company in their Property Accounting area.

Alumni News continues on the next page

In Memoriam

Dr. Theodore Cairns during the 50s.

Theodore Cairns Dies

Theodore L. Cairns, Ph.D. '39 (Chemistry with Adams) died on September 26, 1994. From 1941 until his retirement in 1979 he worked with the DuPont Central Research Department, and served from '71 to '79 as the director. His research centered on the fields of polyamide, acetylene and cyanocarbon chemistry.

Dr. Cairns served on numerous advisory boards and committees. He was chairman of the ACS Division of Organic Chemistry, and a member of the American Association for the Advancement of Science. He served on the National Academy of Science Committee for the Survey of Chemistry. Dr. Cairns was appointed by President Nixon to the Task Force on Science Policy in '69. In 1970 he was appointed to the President's Science Advisory Committee. From '74 to '75 he served on the President's Committee on the National Medal of Science and was a past chairman of the Division of Chemistry and Chemical Technology in the National Research Council.

In '68 he received an award for creative research in organic chemistry from the ACS and the Synthetic Organic Chemical Manufacturers Association. He received an honorary degree from the University of Alberta in '70. In '73 he received the Perkin Medal from the ACS and in '74 he was awarded the Cresson Medal by the Franklin Institute.

Victor Aftandilian, Ph.D. '54 (Chemistry with Moeller) died on March 3, 1995. Dr. Aftandilian had been a research chemist for DuPont from '55-'60 and international projects director at Cabot Corporation from '60 to '72.

Charles W. Cremer, B.S. '52 (Chemistry) died on July 2, 1994. He had been a senior research scientist for A.E. Staley Mfg. Co. before retiring in 1990.

We have received word of the death of **E. Erickson,** B.S. '24 (Chemical Engineering).

Norbert A. Goeckner, B.S. '54 (Chemistry) died on July 30, 1994. He earned his Ph.D. degree in organic chemistry at the University of Iowa and completed a postdoc at the ETH in Zurich, Switzerland.

Herbert L. Gray, B.S. '52 (Chemistry) died on March 14, 1994. He was a computer scientist at Argonne National Laboratories and at the Illinois Institute of Technology in Chicago.

Dr. N. Higgins, Ph.D. '48 (Chemistry with Marvel) died on May 13, 1994.

Elmer 'Ronald' Johnson, M.S. '39 (Chemistry) died on April 12, 1994. He retired in '76 from National Lock Co. after 37 years of service.

Wilbur Fisher Kellogg, B.S. '20 (Chemistry) died in April, 1980. He had been a draftsman for the US Army Corps of Engineers.

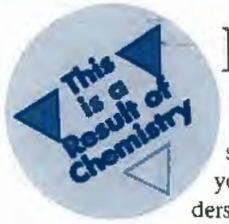
We have received word of the death of **Dr. Jacob Nevyas,** A.M. '29 (Chemistry).

Edward Martin Schap, M.S. '35 (Chemistry) died on July 9, 1994. Mr. Schap has taught at North Central College and in Naperville Schools during his 45 year career in education.

John L. Wagner, B.S. '33 (Chemistry) died on April 15, 1994. He had worked for Stauffer Chemical Company as manager of their chemistry laboratory.

Mortimer A. Youker, Ph.D. '29 (Chemical Engineering with Layng) died on September 14, 1994. Dr. Youker spent most of his professional career at DuPont. He invented the first successful process for freon and pioneered organic fluorines. From '42-'52 he was head of the research division in charge of synthetic rubber, acetylines, and rubber chemicals. He discovered Redox, which doubled the US production rate of synthetic rubber during WWII. He also invented a new class of polymers for fire resistant foam rubber. He served as chairman of the Philadelphia Rubber Group and was a national director of the American Chemical Society.

Chem Undergrads Wow Third Graders



For the last two years, teams of undergraduate students have visited local elementary schools to introduce youngsters to the wonders of chemistry. The students are members of the ACS student affiliate program. The local ACS section covers expenses and Susan Arena, student affiliate advisor and director of the chemistry merit program for emerging scholars, provides supervision and coordination.

The message it sends is "chemistry is good," "chemistry is fun," and "think about becoming a chemist when you're older."

All the students who sign up attend a session where they learn the experiments that they will take to the schools. Each team attends a practice session before they are ready to present their demonstrations. The presentations consist of nine, brief, non-hazardous experiments which include such amazing feats as making signs with invisible paint, which becomes visible when sprayed with windex, putting a needle through a balloon without puncturing it, and building a carbon dioxide rocket.

Sarah Beckman and Julie Klein.

Our students find the program is a valuable experience for them as well as for the audience. They discover that third graders are eager to learn and some show a surprising level of sophistication. The students also learn how to make a presentation, explain, and answer questions. The program is popular with both the U. of I. chemistry students and with the local elementary schools. The message it sends is "chemistry is good," "chemistry is fun," and "think about becoming a chemist when you're older."

Looking for Your Professional Roots?

If you received a Ph.D. from the U. of I. you can obtain a very attractive genealogy of your professional ancestry by contacting Vera Mainz in the chemistry department at the U. of I. The accompanying documentation provides information on every person included in your tree.

Alumni News

James Pribish, B.S. '81 (Chemistry) is a senior Associate Scientist in the Discovery Chemistry Department of Marion Merrell Dow in Cincinnati, OH.

Mark Pytosh, B.S. '86 (Chemistry) has recently joined the firm of Donaldson, Lufkin & Jenrette as vica president in investment banking. Before taking his present position, he had been at Kiddar Peabody.

Paul Rosenwinkel, B.S. '87 (Chemical Engineering) is Vice President Engineering of Resource Control Corp. in Rancoas, NJ, an environmental consulting company serving NJ, NY, PA and DE. He received his P.E. in NJ in 1994.

1990

Kymberli Allen, B.S. '94 (Chemistry) is currently a technical service representative at Morton Automative Coatings, a division of Morton International.

Chad Hinds, B.S. '93 (Chemical Engineering) is a manufacturing associate treining with Van den Bergh Foods. He is looking forward to final assignment after his training is complete.

Alumni Affairs and Development Office Expanding

Since the last issue of the SCS newsletter, two people have joined our office. Ms. Pam Christman will make contacts with alumni, corporations and foundations on behalf of the School and its departments. Pam has been director of development for the College of Liberal Arts and Sciences for the past five years and will now concentrate her efforts on our behalf. Dr. David Paisley, a ten year veteran in our chemistry department will be faculty consultant for SCS development and industrial relations.

Doisy Lecture Series Celebrates Quarter Century Anniversary

Taken at the 25th anniversary of the founding of the Doisy Lecture series, from the left: John Gerlt Biochemistry Department Head, Mrs. Shirley Doisy, Professor Earl Davie, speaker, Mrs. Barbara Doisy, Professor John Suttie, speaker, Dr. Philip Doisy, Professors Richard Gumport and Lowell Hager of the U. of I. Biochemistry Department.

The Doisy Lectures have enjoyed a distinguished history. Established in 1970 by Dr. Edward Doisy, MS '16, the series was inaugurated by Dr. Elwood Jensen and Dr. Charles Huggins, Nobel Laureate, in 1971. Since then, the series has become established as the most distinguished lectureship in Biochemistry at the University of Illinois. Participants have been leaders in biochemistry, molecular biology and biomedical science. Nearly all have been members of the National Academy of Sciences, seven were Nobel Prize winners, four of them receiving that honor after serving as Doisy lecturers.

The format for the lecture series has proved very stimulating. Two scientists working in related areas are invited to make presentations on adjacent days. Dr. Earl W. Davie of the University of Washington, Seattle and Dr. John W. Suttie of the University of Wisconsin in Madison presented the anniversary lectures on April 27 and 28, 1995. Dr. Davie gave a presentation on "The Coagulation Cascade: Its Proteins and Regulation" and Dr. Suttie on "Vitamin K-dependent γ-Glutamyl Caboxylation: Specificity and Directionality of Carboxylation and Fate of Undercarboxylated Proteins". The Biochemistry Department is especially delighted that several members of the Doisy family returned to campus to join the anniversary celebrations.

Conference to Redefine Academic/Industrial Research Interface

Last October a conference organized by Richard Alkire of the Department of Chemical Engineering brought to campus six representatives from different industrial sectors to discuss factors influencing the academic/industrial interface and the consequences for academic education. The underlying purpose was to "provide a forum for transforming and invigorating the research interactions between the Department and industry."

Invited industrial panelists presented their views on the future of industrial research and the future of academic/industrial relationships. These included:

John A. Georges, CEO, International Paper Co., Moderator

J. Michael Fitzpatrick, Vice President, Director for Research, Rohm & Haas Co.

Richard B. Phillips, Vice President, Process Technology, International Paper Co.

Joseph P. Glas, Vice President for Fluorochemicals, DuPont Co.

Allen A. Kozinski, Group Vice President of Refining, Amoco Oil Co.

Stephen W. Drew, Vice President, Manufacturing, Merck & Company, Inc.

Thomas E. Wollner, Vice President, Corporate Research Labs, 3M Co.

Richard C. Alkire, now Vice Chancellor for Research and Dean of the Graduate College, opened the meeting, and William R. Schowalter, Dean of the College of Engineering responded on behalf of the university. John A. Georges, established the foundation for the discussion in his opening remarks. He said,

"If the last fifty years have taught us anything, it is that centralized bureaucratic systems which stifle individual initiative and achievement can never compete with broadly based, decentralized institutions which can bring the power of their planning and research efforts so much closer to the market place. The companies you have represented here...along with this great university, are but a microcosm of this process which is taking place every day throughout the industrialized democracies of the world. Corporations are shortening their research horizons and coupling research more closely to business needs. Gone are the days of the large, basic research units previously found in most corporate establishments.

...Fewer (government) resources are being dedicated to support fundamental research, and this provides the setting in which we find ourselves today: the loss of support opens up the incentive and the opportunity for academic laboratories to investigate how they are going to better fit into the research equation....We expect the meeting and the resulting proceedings to influence the national agenda for Chemical Engineering education and research by providing a road map for maintaining stronger connections between faculty and corporations."

The discussions were taped, and proceedings will be summarized and disseminated widely to stimulate discussion of these issues at the national level.

Excellence Needs Your Help

Help us to maintain and expand our programs by supporting Chemical Science Funds. We have listed below the most active funds in the three departments. If you would like to contribute to a fund not listed, please enter the name beside OTHER.

Matching gifts from your company multiply your dollars. If your company has a matching gift plan, please include a form from your company along with your contribution.

Remember - your contributions make a GREAT difference!

Mark the appropriate box. If sending a check, please make it out to UIF/(fund name). A preaddressed envelope is enclosed for your convenience.

- ❑ *School Facilities Fund:* Upgrades infrastructure, such as the machine and electronic shops, NMR, micro analytical, and mass spectrometry laboratories.
- ❑ *Roger Adams Fund:* Supports the Roger Adams Professorship and funds teaching awards, relocation allowances, and undergraduate scholarships.
- ❑ *Carl Shipp Marvel Fund:* Supports the annual Marvel Lecture and undergraduate research awards.
- ❑ *Carter Fellowship Fund:* Supports the first named fellowship in Biochemistry
- ❑ *The ChE2000 Fund:* Supports educational enhancement in Chemical Engineering.
- ❑ *The Chemical Engineering Annual Fund:* Provides seed money, instructional and research support.
- ❑ *Unrestricted Fund/Chemistry:* Provides start-up funds for new faculty and for other vital needs.
- ❑ *Unrestricted Fund/Biochemistry:* Provides start-up funds for new faculty and for other vital needs.
- ❑ *Other* _____

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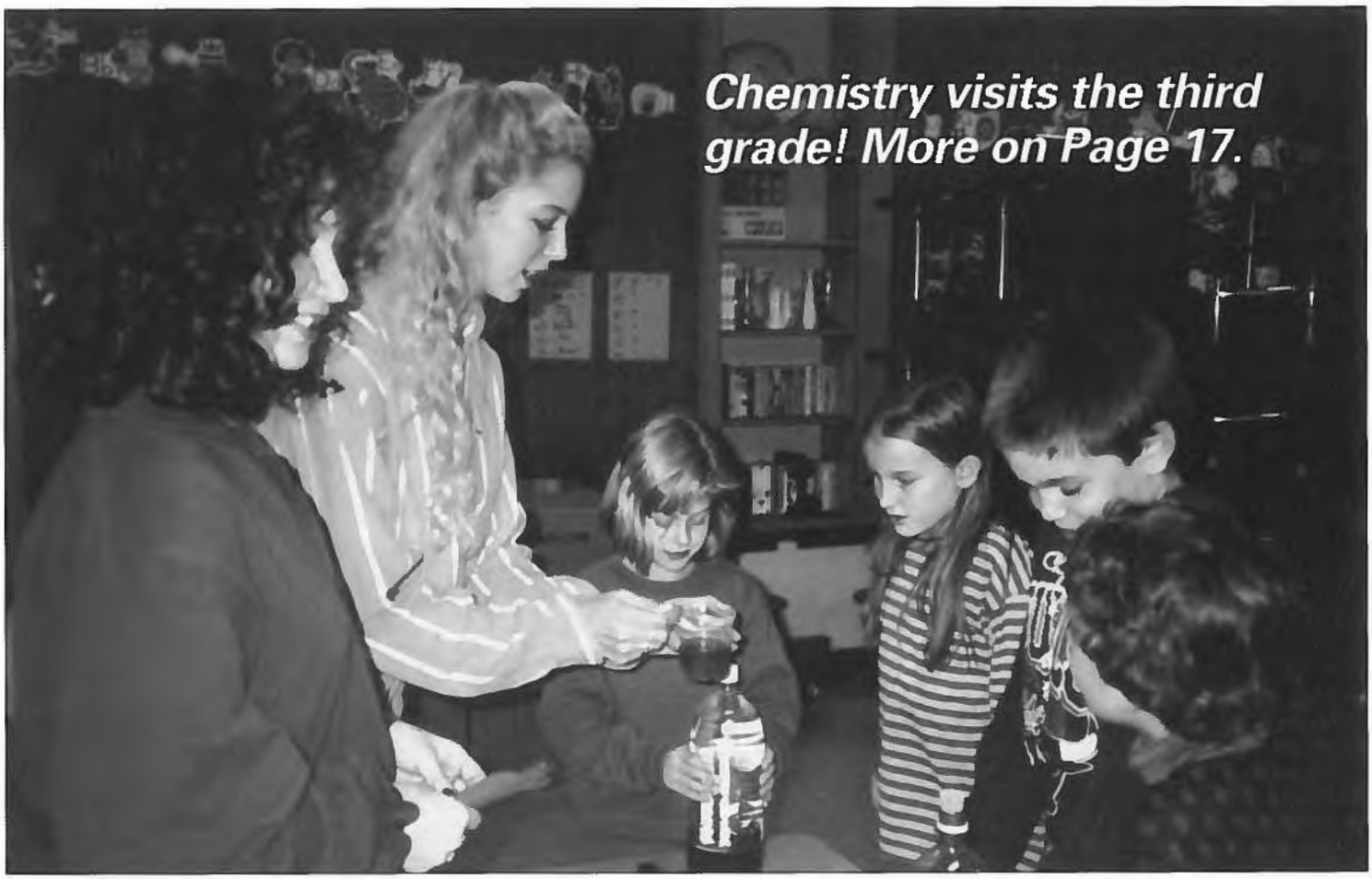

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