

Alumni Newsletter

School of Chemical Sciences

Among Our Outstanding Alumni: The Doctors Schaefer

Today, Dr. John Schaefer is President of the Research Corporation, the second oldest foundation in the United States. His wife, Dr. Helen S. Schaefer, a recognized civic leader, is active in groups that encourage females to enter the natural sciences.

In the offices of the Corporation, surrounded by evidence of their many interests—in the fine arts, old books, photography, antique carpentry tools and scientific instruments, they describe their incredible careers with utmost modesty. Listening to them, it would seem as though they had merely accepted opportunities that came their way.

But this is far from true. John Schaefer has used his talents to create programs for the Research Corporation that fill important niches in science education. The Corporation was founded in 1912 by Frederick Gardner Cottrell, a scientist and inventor, who used the proceeds from the manufacture of his electrostatic precipitator for the advancement of science and technology.

The current grants program includes the following: The Cottrell College Science Grants encourage scientific research at public and private undergraduate institutions to invigorate the classroom and provide research opportunities for students. The Research Opportunity Awards help productive, creative "mid-career" scientists to pursue new areas of research. The General Foundation Grants encourage promising young scientists to follow speculative research in the natural sciences. A new, experimental High School-College Research Partnership program has been established to create summer research opportunities for science teachers.

The Corporation has an exceptional track record in identifying promising young talent. Eighteen grantees have gone on to win a Nobel Prize. The Corporation also gave John Schaefer his first research grant.

One of the underlying principles of the Research Corporation program is to bring talented young people into the natural sciences, a philosophy shared by Helen Schaefer and illustrated in her work. She is a board member of WISE (Women in Science and Engineering) at the University of Arizona. The WISE program reaches down into the junior and



senior high schools and sponsors workshops for girls and their parents. In the workshops the girls have an opportunity to hear and meet some of the foremost women scientists and also to spend time in interesting hands-on projects. Anecdotal evidence suggests that this experience has been instrumental in drawing girls into scientific fields during their college careers.

Both Schaeferes are concerned about poor teachers' colleges that attract poor students, who, in turn, are afraid of mathematics and the natural sciences. These fears are communicated to pupils and turn them away from science studies. As Helen Schaefer said, "If you don't pique the students' interest in high school, and they take little or no math and/or science, colleges cannot make up the deficit."

The Corporation provides research opportunities for students and young faculty at the liberal arts colleges. These are designed to strengthen science programs in the liberal arts setting, an area largely ignored by most federal

granting agencies.

In different ways both Schaeferes are active today in improving science education but the trajectories of their careers have been markedly different. His career has been linear although his velocity has been exceptional. Hers took many turns and twists as she combined her abiding interest in mathematics and physical science with her responsibilities as mother, homemaker, and wife of a very public figure.

A Shooting Star With Staying Power

John Schaefer was a teaching and research assistant at the University of Illinois where he completed his Ph.D. in 1958, while Professor Herbert Carter was Head of the Department of Chemistry. He went on to a postdoctoral fellowship at Caltech and a position as Assistant Professor of chemistry at Berkeley. Later, when he was Dean of Liberal Arts at the University of Arizona he found a position for Carter as assistant to the Vice President for

Research. Accordingly, he jokes, "Carter got me my first job and I got him his last".

In 1960 John Schaefer obtained a position in the Chemistry Department at the University of Arizona through the recommendation of Professor "Speed" Marvel, a friend and fellow ornithology enthusiast. In 1968, at the age of 34 he became full professor and Head of the Department of Chemistry. His career in administration had been launched.

Two years later, he was asked to take the position of Dean of the College of Liberal Arts. He accepted since he had begun to realize that he had a talent for working with people as well as with chemicals. He enjoyed his growing contacts with a wide range of disciplines. Always an avid reader, he found time to organize and teach a course in the humanities, alongside his administrative responsibilities.

Within less than two years, at the age of 37, John Schaefer rose to the ultimate position at the University of Arizona and remained president for 11 years, longer than most top administrators in the country. During his presidency, he built the University into a true "quality" school. The research budget quadrupled; the library rose in rank from 72nd to 17th in the nation, with a budget ranked nationally as number 6.

One of his proudest achievements was to establish at the University the Center for Creative Photography, the premier institution of its kind in the world. The Center holds the archives of Ansel Adams and Edward Weston, among others, and offers excellent facilities for teaching and research. The Center grew out of Schaefer's strong personal interest in photography, which combined his flair for the fine arts with his knowledge of chemical processes.

During his tenure as president of the University of Arizona, he was asked to accept the presidency of the Research Corporation. While at the University, he had served on the Board of Directors of the Corporation. When the Research Corporation was looking for a leader who could handle its financial intricacies, and develop vigorous new programs to meet emerging needs in science education and the exploitation of developing technologies, he decided to step in. He quickly felt at home in his new position. As he says, "the environment of the Research Corporation is much like that of a university, minus the football team".

Helen Schaefer: The Successful Blend Of Multiple Careers

In 1958 Helen Schaefer left the U. of I. with an M.S. but without her Ph.D., because her husband had completed his degree and was scheduled to begin his postdoctoral work at Caltech. For the next two years, while her husband worked in California, Helen Schaefer found space in the labs at Caltech and at Berkeley, her husband's next destination, to continue work towards her Ph.D. Fortunately, her advisor, Professor Peter Yankwich visited California frequently and helped her continue her studies.

After the move to Arizona, two children came along and chemistry moved to the back burner, partly because of lack of time but also because local nepotism rules prevented her from working in chemistry at the University of Arizona. The nepotism rules continued until overturned by court order in 1970.

Accordingly, Helen Schaefer became involved in civic and fine arts projects including the United Way, League of Women Voters, the Tucson Symphony Society, and a local hospice program, to name just a few. She maintained her involvement in science societies, including Iota Sigma Pi, Sigma Xi, and Sigma Delta Epsilon—Graduate Women in Science. Her efforts brought recognition. In 1977 she was named Tucson Woman of the Year. A scholarship at the University of Arizona, sponsored by the Faculty Women's Club, was named in her honor.

When her children were old enough for semi-independence, she returned to the University of Illinois for two summers to complete her Ph.D. The degree was awarded in 1978, exactly 20 years after she had left. As she points out, she was extremely fortunate that her thesis subject had not been "scooped" during the 20 year hiatus. Her career path also provides evidence to counter the entrenched myth that scientific study must be continuous, especially during the scientist's "most productive" years, i.e. the 20s, 30s, and 40s.

The Growth Curve Continues

In the past year, John Schaefer has set up a new corporation called Research Corporation Technologies to provide comprehensive technology transfer services to nonprofit institutions. The new entity has the flexibility to invest in applied research and development and to back business start-ups and joint ventures. The company aggressively stimulates disclosure of useful inventions, helps campus

inventors perform feasibility studies and build prototypes and, at later stages, can develop and commercialize new products and processes. The company builds on the successful history of the Research Corporation in identifying and developing important inventions, such as cortisone, the laser concept, processes for synthesizing vitamins A, B₁ and B₁₂, the first heart-lung machine, and hybrid seed corn.

Also, in the recent past, John Schaefer has brought the Research Corporation concept to England and started Research Corporation Limited to carry out the functions of both the Research Corporation and Research Corporation Technologies.

As word of his success spread, John Schaefer has been asked to serve on many private and public boards and commissions. He chaired two education commissions at the state level, and for several years has served on the Board of Governors of the United States-Israeli Binational Science Foundation. He is also a director of Olin Corporation and of National Starch and Chemical, among others.

Helen Schaefer is currently chairperson of the board of directors of a bank in the process of organization. She sees a logical progression from her interest in mathematics to finance to helping launch a new bank to meet the needs of local small and mid-size businesses. This is a market niche often overlooked by giant financial institutions that have lost their local roots.

The increasing involvement by both Schaefer's in a wide range of community activities stems from their philosophy that it is necessary but not sufficient to excel professionally. For them, it is equally important to make a significant contribution to the community and the university which has been a good home to them for a great many years.

Their Ties To The U. Of I.

Despite their busy lives and multiple activities both Doctors Schaefer have maintained a strong interest and commitment to the University of Illinois. They have consistently supported several Chemical Science Funds including the Roger Adams and the Marvel Funds and have contributed generously to the Library Friends, as well. Both are currently members of the U. of I. President's Council. We hope that along with their professional and civic responsibilities, they will continue to be part of the University of Illinois community and active as outstanding alumni of the School of Chemical Sciences.

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Carl Shipp Marvel 1894-1988



With the death of Marvel, Professor of Chemistry at the U. of I. from 1920 until his retirement in 1961, the man known as the "grand old man of chemistry" has passed from the scene.

A pioneer in polymer chemistry, he was responsible for the development of innumerable products which have become staples of modern living, including plastics used in acrylic floor wax, plastic wrap, vinyl used to make aircraft parts, and synthetic rubber used in tires.

Towards the end of his life, he became interested in heat resistant polymers that could withstand temperatures of 300 to 500 degrees Centigrade. He developed the material "polybenzimidazole" which was used for flame repellant suits worn by astronauts.

Marvel was born in Waynesville, Illinois and was introduced to chemistry at Illinois Wesleyan where he earned A.B. and M.S. degrees simultaneously. In 1915 he began graduate work at the U. of I. on a fellowship and completed his M.A and Ph.D. degrees in 1920. While a student at Illinois, he earned his enduring nickname "Speed". Because he took an overload of courses, he studied late into the night and nevertheless managed to make it to breakfast before the dining hall closed.

After finishing his Ph.D. under Professor William A. Noyes, Marvel joined the Illinois faculty as an Instructor, became a Professor of Organic Chemistry in 1930, and in 1953 was named Research Professor.

He was responsible for the growth of an entirely new field of organic chemistry, that of polymers. His research in the 30s laid the groundwork for today's polymer plastics technology and introduced polymer chemistry to university research labs. During World War II he directed vital research on synthetic rubbers and developed butadiene-styrene copolymers which constitute the main component used in tires.

Although he received major recognition for his research, Marvel always considered teaching and training of other chemists his major contribution. Among his outstanding students was Vincent du Vigneaud, who won a 1955 Nobel Prize. The 176 Ph.D. students who came out of his laboratory became known as "Marvel's Army".

Marvel's reputation among colleagues borders on the legendary. He was supposed to be able to recognize and identify the components of any mixture of organic compounds merely by smell. He owned about four dozen

patents in polymer chemistry and in 1928 began a lifetime of consulting at DuPont, which helped secure its standing as a world leader in the production of synthetic fibers.

He was honored by his profession, his country and by the universities he served. Among his many awards were the Willard L. Gibbs Medal, Chicago Section of the ACS in 1950, the ACS award in Polymer Chemistry in 1964, the Priestley Medal of the ACS in 1976, and the National Medal of Science in 1986.

Professor Marvel was president of the ACS in 1945 and lived to see four of his students become president of the organization: William J. Sparks (1966), Charles G. Overberger (1967), Bernard S. Friedman (1974), and William J. Bailey (1975).

A Marvel Fund supporting an annual lecture series was established at the University of Illinois. At the University of Arizona, where he taught after his retirement, the chemistry buildings were dedicated to him and named the Carl S. Marvel Laboratories of Chemistry.

There is a Marvel Hall at the Washington, D.C. headquarters of the American Chemical Society. In 1986, he was inducted into the Plastics Hall of Fame.

Speakers at the memorial tribute, held on February 19, 1988, at the University of Arizona, included some of the foremost leaders of the American chemistry community. Most had ties to Illinois as well. Among those with an Illinois affiliation were Dr. Richard E. Heckert, Chairman of the Board of Directors and CEO of DuPont, (U. of I. Ph.D. '49). Professor Herbert Carter representing the National Academy of Science, (U. of I. Ph.D. '34, Professor of Chemistry and Vice-Chancellor for Academic Affairs). Dr. William J. Bailey (U. of I. Ph.D. '46) representing the American Chemical Society. Professor Nelson J. Leonard, Professor Emeritus of the U. of I. Department of Chemistry, and Dr. John P. Schaefer (U. of I. Ph.D. '58) President of the Research Corporation.

Marvel was a giant in the field and his influence was felt around the world. Dr. Herbert Carter, a colleague of Professor Marvel's at both the University of Illinois and at the University of Arizona said, "He has contributed more to the development of polymer science and to the careers of polymer chemists than anyone I know. . . . From the 1920's until today, he has been a superb teacher, chemist, colleague, fellow scientist, a top person in every way".

The Molecular Spectroscopy Lab Is Second To None



Dr. Vera Mainz, the laboratory's director, wears many buttons on her lab coat. One says, "You'll never know if you don't ask" and she means it. Questions are the lifeblood of the teaching function that the lab offers in addition to the more traditional consultation services.

This philosophy has helped to turn a very good lab into an outstanding one. So far as she knows, the U. of I. facility is "second to none" among academic institutions today.

The lab provides an excellent array of equipment that is a major attraction for recruiting researchers who are sought after by premier chemistry departments. In addition, the lab offers important services, appropriate for a teaching/research university. Dr. Mainz's philosophy is, "we won't do the experiments for you but we'll give you all the help you need so that you'll be able to do them yourself."

The laboratory covers 3000 square feet of densely packed space in the Roger Adams Laboratory. For the novice, getting from one end of the lab to the other resembles a slow slalom course. The lab boasts 7 Fourier Transform Nuclear Magnetic Resonance (NMR) instruments, 2 continuous wave (CW) NMR instruments, plus 4 other types of spectrometers located elsewhere in the chemical sciences complex. Four of the NMR instruments are very recent acquisitions of the most advanced technology: 3 are FTNMR multinuclear solution instruments, one is an FTNMR instrument with a $1\text{H}/13\text{C}$ switchable probe, and one of the multinuclear instruments has multinuclear solid state FT/CP MAS (Magic Angle Spinning) capability.

Using The Lab: An Example

Because NMR spectroscopy is such a popular

research tool, a wide range of experiments are being carried out in the lab. For instance, Dean Millar, a graduate student of Professor Klemperer, is doing both solution and solid state NMR in experiments to develop "designer" types of ceramics such as glass, with unusual, specified properties.

Using starting materials such as silicon alkoxides, he has gradually hydrolyzed the compound and condensed it into a gel. The transformation process is reflected in the signals generated by solution NMR and demonstrates that the structure of the molecules has remained fundamentally intact. After the gel has solidified, further information is obtained on the final product by supplementing traditional FTNMR experiments with recently developed magic angle spinning (MAS) solid state NMR techniques.

The Staff

The lab has a staff of 5 plus a faculty advisor. Dr. Paul Kiefer, whose training was in organic chemistry, shares most of the consulting work with Dr. Mainz, whose background is in inorganic chemistry. They discuss with researchers how best to conduct the planned experiments, what instrumentation to use, and how to detect and interpret the relevant signals. They are delighted to try out new types of experiments and feel confident that they can replicate any technique reported in any academic journal. In some cases, they are active collaborators as well as consultants and produce articles together with other faculty.

There are three spectroscopists in the laboratory, each of whom has sole charge of several instruments, trains users, keeps the equipment in working order and helps to conduct the experiments. An electrical

engineer helps to maintain and repair the instruments to minimize downtime, and builds the variety of auxiliary equipment needed for the research projects.

The entire staff share the working philosophy of the lab, summarized by Andrew Derome in the Preface of his book, *Modern NMR Techniques for Chemistry Research*: "Even if you do not intend to operate a spectrometer, it is irresponsible not to acquire some familiarity with the interaction between parameters such as acquisition time and resolution, or repetition rate, relaxation times, and signal intensity. Many errors in the use of modern NMR arise because of a lack of understanding of its limitations."

Teaching And Training

In order to put this philosophy into practice, the staff of the lab are heavily involved in training and teaching. Anyone who wants to use the lab has to demonstrate competence on their instruments of choice. Literally, hundreds of students are "checked out" every year. Training on routine instruments is done by a "group expert", a member of each research group, designated by the group director. Final checkout is done by the lab staff on an individual basis. These are time consuming services and many days are devoted to student checkouts. On non-routine instruments, both training and checkout are done by the lab staff on a one-on-one basis and can require several days of the spectroscopists' time.

Dr. Mainz also gives formal classroom lectures. Some semesters she offers a series of 10 non-credit lectures in NMR techniques, in addition to teaching part of the organic chemistry course, and team teaching at the U. of I. Medical School. These are all part of the total contribution of the lab to keeping chemistry at Illinois at the very forefront of the field.

Fortunately, as Dr. Mainz points out, advances in NMR have been so rapid in the last 10 years that there is reason to think that a plateau may have been achieved and that the pressure to forge ahead in terms of hardware may be temporarily relaxed. She says, "The machines have achieved such a level of excellence that we now have time to exploit what we have while using the computers to improve the resolution and interpretation." But, if any new advances should happen tomorrow, the U. of I. Molecular Spectroscopy Lab would be sure to be fully informed, as befits a lab that is "second to none".

Monsanto Sponsors Organic Conference

The 1987 Organic Chemistry Allerton conference, held on October 17, 1987, for students, faculty, and visitors was sponsored by the Monsanto Company. Dr. Gerry Dutra and Dr. Mel Ruppel of Monsanto initiated the project.

The conference was student organized and managed. Ten graduate students presented twenty minute papers on the subject of their research and 29 others presented poster sessions. One of the purposes of the conference was to give students an opportunity to develop skills both in presenting their work and learning from the work of others. This provided an introduction to the communication which is practiced at professional meetings.

In addition, the conference allowed the attendees to learn about work in areas they might not already have encountered in their own research. The presentations were of high quality and the program was enthusiastically received. The active participation in the poster session was especially notable.

For many participants, the conference provided opportunities to share ideas and to get acquainted in an informal setting with both faculty and other students. Since the conference took place early in the academic year, students at beginning stages of their graduate careers could get information on research possibilities available to them.

Monsanto provided support for the conference to demonstrate their appreciation of the contribution that U. of I. graduates have made to the company. Because of the success of the 1987 conference, Monsanto is planning to fund a future conference for the Organic program. Tentative plans call for a conference that may be faculty organized and bring in outside experts. The next Monsanto Conference may be organized around one or more special topics or deal with recent developments in the field.

James W. Westwater Symposium To Honor Chem Engineering Pioneer

A Symposium on Boiling and Condensation on May 5 and 6, 1988 will reflect the lifelong research interests of Professor James W. Westwater, who has been at the University of Illinois for 40 years. Professor Westwater was head of the Department of Chemical Engineering from 1962-1980 and was responsible for the rapid expansion and strengthening of both the undergraduate and graduate programs.

Seven internationally known researchers, under the chairmanship of Professor James Hartnett of the U. of I. at Chicago and Professor Bei Tse Chao of the U. of I. at Urbana, will present papers which will be published in *International Communications in Heat and Mass Transfer*.

The symposium will present a summary of important recent developments relating to the central theme of Westwater's research regarding heat transfer accompanying a phase change. Westwater pioneered the use of high speed photography that led to the development of realistic theories for boiling heat transfer. His first film, made in 1954, received 80 showings at private companies, universities, technical societies, and television.

He developed techniques for high and low speed photography through a microscope to study nucleate, transition and film boiling, condensation, freezing, the formation of Bernard cells, and the nature of nucleation sites for boiling and condensation. He has shown how properly designed fins can greatly enhance heat transfer rates during boiling.

Although Westwater travels extensively, his roots are close to home. He was born in Danville, Illinois, and received his B.S. degree in chemical engineering from the U. of I. in 1937. In 1948 Westwater received the first Ph.D. ever granted by the University of Delaware. His advisor was Professor Allan P. Colburn. Immediately thereafter he joined the faculty of the Chemical Engineering Department at the University of Illinois where he has become known as an outstanding teacher and administrator as well as an admired researcher.

Among Westwater's many awards are the Max Jakob Award, received jointly from the AIChE and ASME, the William H. Walker Award of the AIChE and the Vincent Bendix Award of the ASEE. He was elected to the National Academy of Engineering in 1974. He was a Director of the American Institute of Chemical Engineers from 1968-1970 and received the Founders Award for the advancement of Chemical Engineering in 1984. On the 75th anniversary of AIChE, he was recognized as one of 30 most distinguished chemical engineers in the country.



Seemon Pines/Merck Conference Planned



Seemon Pines' (Ph.D. '51) Directors' Scientific Award will fund a biannual conference for Organic Chemistry at the University of Illinois. Dr. Pines who is Vice President at Merck for Process Research and Development, received the highest award that Merck bestows on its researchers in recognition for his outstanding scientific contributions.

Dr. Pines was honored for his work on the antibiotic "Primaxin", which offers the broadest activity spectrum of any available antibacterial used in human therapy. In some cases, it takes the place of two or three drugs that might otherwise require expensive, time-consuming blood monitoring or other tests or supervision.

His achievement is all the more remarkable because Primaxin is considered a benchmark in drug synthesis and the most difficult ever brought to commercialization. According to Merck officials, "Dr. Pines achieved the first full disclosure of the chemistry leading up to the drug and headed development of the process by which it is produced commercially".

The recipient of the award has the privilege of designating an educational institution which receives the associated grant to carry out a special project. Dr. Pines designated the Organic Chemistry Program of the University of Illinois.

The biannual Seemon Pines/Merck conference is to be held in the Fall, and will be open to all faculty, graduate students, postdoctorates and undergraduates who are active in organic chemistry research. The structure will be based on the Gordon Research Conference model with a mixture of brief presentations, poster sessions, and informal social interactions. The first Seemon Pines/Merck conference is planned for Fall, 1988.

Symposium On Solid State Chemistry To Honor Curtin



Professor David Y. Curtin's retirement will be recognized with an inauguration. On June 10, a celebration will precede the first Midwest Symposium on Organic Solid State Chemistry. The coincidence is appropriate. For the past twenty years Professor Curtin has been building this new field of chemistry together with his colleague, the crystallographer Professor Iain C. Paul, who together with Professor Stephen R. Byrn, one of their former students and now at Purdue University, is organizing the symposium in Curtin's honor.

Curtin's career at the University of Illinois spans 37 years and two distinct phases of professional activity. In the first half of his career, Curtin's major contribution was to the theory of organic rearrangements, by demonstrating its dependence on stereochemical control. This work resulted in a general understanding of migration ratios and aptitudes in a variety of reactions.

The second phase of Curtin's work started in the late 60s when he began to explore and define the fundamental organic chemical problems of the solid state. His early work on stereochemistry, coupled with a fascination for the three dimensional arrangements of organic molecules in crystals led him to explore rearrangements occurring in solids, reactions of solids with gases, and proton transfer reactions in crystals. His recent work has focused on exploiting the potential of the properties of chirality and polarity as they uniquely apply to crystals in a variety of chemical processes.

Much of his work focuses on a single, perfect crystal of a reagent. The crystal is teased, taunted, photographed, heated, pricked, cooled or photolyzed until it responds. Then, every minute detail of its physical and chemical changes is precisely monitored.

Curtin has shown how stereospecific syn-

theses can be carried out in a single crystal, how molecules can migrate within the crystal, how the symmetry of molecular packing patterns is as important to reaction mechanism as the symmetry of individual molecules, and how crystal symmetry relates to the physical and chemical properties of organic solids.

Today, Curtin is unquestionably regarded as the father of organic solid-state chemistry in the United States. His work has made the study of organic solids a legitimate, if somewhat esoteric, undertaking. It has fostered the growth of interdisciplinary research areas such as design and synthesis of organic nonlinear optical and ferroelectric materials, and his studies of thermal and photochemical properties of organic solids have found important applications in the pharmaceutical industry.

One of the most enduring contributions deriving from his solid-state work may be the rediscovery of optical microscopy and visual observation as powerful analytical tools for the organic chemist.

Professor Curtin's work has been recognized by his colleagues and by the professional community. At the U. of I. he has been Head of the Organic Chemistry Division (1963-65), Associate Head of the Department of Chemistry (1967-72) and he is currently the R.C. Fuson Professor in the department. He is a member of the National Academy of Sciences and a Fellow of the American Association for the Advancement of Science and has been a member of the advisory board of *Organic Reactions* since 1965.

At the symposium, which will be held on Friday and Saturday, June 10-11, 1988, Professor Joel Bernstein of the Ben Gurion University of the Negev at Beersheva, Israel, will give a keynote address on recent developments in organic solid state chemistry, with special emphasis on Curtin's contributions. Professor Curtin himself will have the last word, by giving the final lecture of the inaugural symposium.

Anyone wishing to attend or obtain further information about these events should contact Professor Iain Paul of the U. of I. Chemistry Department.

New Solutions For Old Stereochemical Problems



As the relationship between the structure of chemical substances and their biological responses is studied in increasing detail, the subject of stereochemistry assumes increasing importance. Stereochemistry pertains to the three-dimensional shape of molecules having a given composition and connectivity. It can be relative or absolute. Absolute stereochemistry refers to the shape perceived by an observer external to the system. Compounds which differ only in absolute stereochemistry are called "enantiomers".

Professor Pirkle and his group are studying how one molecule "identifies" the structure and shape of another. Particular emphasis is placed on "chiral recognition", the ability to differentiate the mirror images of molecules, usually of synthetic origin. Just as a glove (a simple chiral system) can distinguish one hand from another, a living organism can usually distinguish one enantiomer of a substance from another. This is important because enantiomers can differ in many respects, in smell, taste, and, more importantly, in their deep seated physiological effects. For instance, levomethorphan, a synthetic morphine-like compound, is a federally regulated addictive narcotic having analgesic properties. Its enantiomer, dextromethorphan is present in many over-the-counter cough syrups, for it relieves coughing.

Naturally occurring complex organic molecules, such as sugars, amino acids, alkaloids and steroids usually occur in only one enantiomeric form. Synthetic processes, on the other hand, usually lead to one-to-one mixtures of enantiomers, termed "racemates". Separation of enantiomers becomes a very important problem for pharmaceutical firms because one enantiomer may be beneficial and the other harmful. A good historical example is the synthetic drug Thalidomide. One enantiomer controlled morning sickness and insomnia of pregnant women whereas the other caused serious birth defects.

Pirkle's stereochemical research began in 1966 when he demonstrated that the addition of an appropriate chiral solvating agent to a mixture of enantiomers can cause them to have nonidentical nuclear magnetic resonance spectra. The technique is now widely used to determine enantiomeric purity and to determine whether a given enantiomer is "left-handed" or "right-handed".

More recent research has led the Pirkle group to design chiral molecules which, when bonded to the surface of finely divided silica gel particles, serve as a "chiral stationary phase" (CSP) on which the enantiomers of substances can be separated chromatographically.

The CSP particles are tightly packed into a short, narrow steel column, solvent is pumped through, and the mixture of enantiomers is introduced at the top. The solvent flowing through the column eventually causes both enantiomers to elute and pass through a flow cell in an ultraviolet detector. With a properly designed CSP, the enantiomers will physically separate and one will elute after the other. The detector gives a quantitative measure of each enantiomer and the different enantiomers can be collected separately for further use. Finally, the order of elution provides insight into the absolute configuration of the enantiomers and of the CSP. The process can be scaled up to afford multigram quantities of pure enantiomers.

To date, Pirkle's group has developed CSPs on which tens of thousands of compounds may be separated. Some of these CSPs have been commercialized and are manufactured in Europe and Japan as well as in the US. In addition, Professor Pirkle's research has moved into the design of chiral reagents and catalysts for stereochemical control during synthesis, into methods for converting synthetic racemates into a single enantiomer, and into the study of enantioselective membranes. This research has brought recognition within the academic community and beyond. Professor Pirkle's work has considerable commercial application, not just for the pharmaceutical industry but also for materials used in electronic switching devices and in medical imaging instruments.

Faculty Honors

Richard Alkire Elected To National Academy Of Engineering



Professor Richard C. Alkire, Alumni Professor and Head of the Department of Chemical Engineering, has been elected to membership in the National Academy of Engineering for "imaginative research on engineering aspects of electrodeposition and corrosion and for leadership in electrochemical engineering." Election to the Academy is among the highest professional distinctions accorded an engineer. Membership honors those who have made "important contributions to engineering theory and practice or unusual accomplishment in new and developing fields of technology."

Professor Alkire received his B.S. from Lafayette College in 1963, and his Ph.D. in 1968 from the University of California (Berkeley). He joined the University of Illinois in 1969. In 1985 he received the Carl Wagner Memorial Award of the Electrochemical Society and the Professional Progress Award of the AIChE. He served as President of the Electrochemical Society in 1986-87.

Alkire's election brings to six the number of chemical engineering faculty at Illinois who are members of the Academy, more than any other chemical engineering department in the nation. Put another way, the election of Professor Alkire means that the U. of I. has more members of the National Academy than 24 states. Others members of the Academy at the University of Illinois include Professors Harry Drickamer, James Westwater, Thomas Hanratty, Charles Eckert, and Walter May.

Professor of Chemical Engineering **Anthony J. McHugh**, has received a Senior U.S. Scientist Award from the Alexander von Humboldt Foundation in Germany. The recipient receives a grant and is given the opportunity to carry out research in Germany. Professor McHugh will be studying polymer materials science at the Institute for Materials Technology of the University of Kassel.

Professor of Chemical Engineering **Harry G. Drickamer** will receive the Elliott Cresson Medal from the Franklin Institute of Philadelphia. The Cresson Medal was established in 1848 to recognize discoveries or original research leading to practical products or methods that add to human knowledge. Previous Cresson medalists include Andre Sakharof, Orville Wright, Alexander Graham Bell and Wenher von Braun. In addition, Professor Drickamer received the first Distinguished Professional Achievement Award established by the University of Michigan Alumni Association.

Professors of Chemistry **John Katzenellenbogen** and **Thomas B. Rauchfuss** have been named University Scholars for three year terms. They are among a select group of only 15 distinguished faculty chosen in the entire campus this year. In addition to the honor, they will receive a research stipend for each of the three years.

Professor of Chemistry **Scott E. Denmark** has been selected to receive the 1988 Award for Excellence in Organic Chemistry, sponsored by Stuart Pharmaceuticals, a subsidiary of Imperial Chemical Industries. In addition to the honor the award carries a sizable sum to further his research program.

Professor of Chemistry **Greg Girolami** has been awarded a Sloan Fellowship for 1988-1990. The award carries a research current which will be used to carry further his current research on chemical vapor deposition.

Professor of Chemistry **Stan Smith** and Dr. **Loretta Jones** took two software awards sponsored by EDUCOM and the National Center for Research to Improve Postsecondary Teaching and Learning. Professor Smith and co-workers won the Best Tutorial award, with their *Introduction to General Chemistry*. In addition, Stan Smith and Loretta Jones received the award for the Best Chemistry Software with their *Interactive Videodisc Lessons for General Chemistry*.

Professor of Chemical Engineering **Jonathan J.L. Higdon** has received an LAS Award for Distinguished Teaching. The award, which carries a salary increment plus a personal check, will be given at the annual LAS Awards Banquet.

Professor **Larry Faulkner**, Head of the Department of Chemistry, has been asked to serve on the academic advisory council of Dow Chemical Company. The council may be the first continuing academic advisory council established in the corporate world.

Professors of Chemistry **Robert M. Coates** and **Paul C. Lauterbur** have been elected fellows of the American Association for the Advancement of Science.

Professor of Chemistry **Thomas B. Rauchfuss** has been appointed a Beckman Associate for the 1988/89 academic year. This award is given to outstanding young faculty. It releases them from teaching and gives them additional time for research.

Alumni News

Two U. Of I. Alumni Recognized By American Institute Of Chemists

In the 15 years since the first Presidential Citation of Merit Awards have been given by the American Institute of Chemists, two of the seven so honored have been U. of I. alumni. According to the bylaws: "A Presidential Citation of Merit may be awarded to encourage and honor innovation and creativity in matters affecting the professional interests of chemists and chemical engineers or to recognize exemplary service to the profession and/or The Institute."

The 1986 recipient was Professor **Charles H. (Hap) Fisher** Ph.D. '32 (Chemistry with Fuson) who has been Adjunct Research Professor at Roanoke College in Salem, VA since 1972. The first year that the award was given, one of the two recipients was Dr. **William E. Hanford** Ph.D. '35 (Chemistry with Adams) who is a well known consultant to the chemical industry and has been Director of Research at GAF Corporation, Vice President of Research at M.W. Kellogg Company, and with the Olin Corporation.

Prize To Honor Sisson

A prize bearing his name has been established at Roanoke College in honor of **Wayne A. Sisson** Ph.D. '31 (Chemistry with Clark) who died in May, 1986. The prize is to be awarded to an outstanding undergraduate physics or chemistry major. Dr. Sisson was a pioneer in cellulosic and fiber sciences who received the Anselm Payen Award of the ACS in 1966. Most of his professional career was spent with the American Viscose Corporation, as an industrial research chemist and as assistant director and manager of the Avicel Research and Development Laboratory. His x-ray diffraction studies of fibers led to the improvement of the physical properties of cotton and rayon.

In Memoriam

Word has come to us that Dr. **Jerome Burtle** Ph.D. '37 (Chemistry with Buswell) has passed away. He had been Research Chemist with the 3M Company in St. Paul, MN.

Dr. **Albert J. Cross** B.S. '78 died on July 15, 1987. He received his Ph.D. in Chemistry from the University of Chicago in 1984 and did postdoctoral research at the University of California in San Diego. At the time of his death he was senior scientist at Biosym Technologies in San Diego, California. During his brief career Dr. Cross published 12 scientific papers.

James M. Fulton M.S. '33 died on February 21, 1987. Mr. Fulton came to Pittsburgh, PA after leaving the U. of I., to work for the Gulf Oil Corporation and remained there for 37 years as a patent engineer. He retired in 1972. He was the first micro-chemist at the Mellon Institute.

Dr. **Edwin R. Littmann** Ph.D. '29 (Chemistry with Marvel) died on October 19, 1987. In 1962 he retired from Exxon as a Technical Marketing Specialist and was active in the New Jersey Institute of Chemists until the end of his life.

Perry Andy Martinson B.S. '33 died on July 18, 1987. Before his retirement in 1975 as Senior Vice President, he had spent 37 years with Johns-Manville Corporation in Chicago, IL.

John Douglas Schumacher M.S. '32, retired personnel manager of Times-World Corporation died on December 31, 1987. He had been in that position for 15 years prior to his retirement in 1973. His career had covered a range of positions. His first professional employment was as professor of chemistry at Roanoke College. After nine years in academia, he became chemist and assistant to the personnel manager at the former American Viscose Corporation plant in Roanoke, where he stayed until moving to Times-World in 1958.

News Of The Classes

'25

Professor Emeritus **Shao-Hen Li** Ph.D. 1925 (Chemical Engineering with Parr) was honored at the 85th birthday of Shejiang College of Engineering in Hang Zhou, China, for more than 20 years of service to the Department of Chemical Engineering.

'46

Dr. **Minor J. Coon** Ph.D. '46 (Biochemistry with Rose) is Victor C. Vaughan Distinguished University Professor and Chairman, Department of Biological Chemistry, University of Michigan Medical School. He has been elected a Senior Member of the Institute for Medicine of the National Academy of Sciences. He was a Distinguished Lecturer at the University of Cincinnati last January and last May received a Doctor of Science (honorary) degree from Northeastern Ohio University College of Medicine.

Professor **R. Curtis Johnson** M.S. '46 retired last December from the Department of Chemical Engineering at the University of Colorado at Boulder.

'48

Donald G. Leavitt B.S. '48 is a patent attorney with his own firm in St. Louis, specializing in chemical patents. He received his law degree from the University of Michigan in 1951.

'51

Thomas G. Miller Ph.D. 1951 (Organic Chemistry with Fuson) retired from Lafayette College in June 1987 as the John H. and Frances Larkin Professor of Chemistry. During his 30 years of service he had been head of the department for 10 years.

Dr. **Walter Robb** Ph.D. '51 (Chemical Engineering with Drickamer) has been promoted to Senior Vice President for Corporate Research and Development at the General Electric Company.

'53

Donald G. Daus B.S. '53 was promoted to Captain of the US Navy in the Judge Advocate General's Corps.

'54

J.S. Paul Schwarz B.S. '54 is president of Pure Synthetics, Inc., in Ridgewood, New Jersey. His company supplies all the common cyclopentenolones of interest to the flavor industry. For the last few years, his hobby has been to investigate the C_p-atomic weight relationship. His results were presented last year at a national meeting of the Division of Chemical Education.

'58

Dr. **Roberto Lee** B.S. '58, an engineering group consultant with the Monsanto Company in St. Louis, has been named a Fellow of the American Institute of Chemical Engineers (AIChE). Since 1982, Dr. Lee has been involved with technology development and applications of biochemical process design. He recently served as lead process engineer for the design, development and start-up of the company's Bioprocess Development Facility.

'59

Dr. **John T. Marvel** A.B. '59 has been named Vice President of Research and Development at Ethyl Corporation. Previously, he had served 19 years at Monsanto Corporation, most recently as general manager of science and technology for Europe and Africa. His Ph.D. degree was obtained at Massachusetts Institute of Technology.

'60

Dr. **William H. Pittman** Ph.D. '60 (Organic Chemistry with Snyder) is patent counsel in Polymer Chemistry for the General Electric Company, Corporate Research and Development. He received his J.D. from Georgetown University in 1984.

'61

Dr. **Jack W. Ehrmantraut** B.S. '61 has been appointed R&D Director for Dow Chemical Europe. He will be located in Zurich, Switzerland for the next three to five years. Until his present position, he had been Director of R&D for the Agricultural Products Department.

'64

Professor **R. Larry Merson** Ph.D. '64 (Chemical Engineering with Quinn) has been appointed Chairman of the Food Science and Technology Department at the University of California, Davis. His recent research has focused on heat sterilization of foods, including basic studies of heat transfer to canned foods, heat resistance of bacteria and enzymes, and factors affecting *Clostridium botulinum* growth and toxin production.

'66

Dr. **Dave Boger** Ph.D. '66 (Chemical Engineering with Westwater) is a professor at the University of Melbourne in Melbourne, Australia.

'67

Robert O. Petkus B.S. '67 is Manager, Business Development and Planning with the FMC Corporation.

'68

Dr. **Donald E. Woodmansee** Ph.D. '68 (Chemical Engineering with Hanratty) has been awarded a silver patent medallion by the General Electric Company. This medallion honors inventors who have filed ten or more patent applications.

Andrew T. Zander, B.S. '68 was appointed Director of the Systems Laboratory at the Varian Research Center. Previously, he had been project manager at the Perkin-Elmer Instrument Division.

'69

L.J. Cline Love, Ph.D. '69 (Chemistry with Malmstadt) Professor of Chemistry at Seton Hall University, has been appointed to serve on the Analytical Chemistry Instrumentation

Advisory Panel for three years. Professor Cline Love is also director of the Center for Applied Science at Seton Hall.

'70

Donald E. Leary B.S. '70 is currently marketing specialist of the Riston Products Division of DuPont. He has recently been transferred to Texas and has all the surrounding states as his territory.

Jeffrey I. Zink Ph.D. '70 (Chemistry with Drago) is a Professor of Chemistry at UCLA and has been awarded a Guggenheim Fellowship for 1988.

'71

Professor **Joseph C. Stickler** Ph.D. '71 (Chemistry with Pirkle), currently Chair of the Department of Chemistry at Valley State, is spending a year as Visiting Associate Professor of Chemistry at Ohio Wesleyan University.

'72

Tommy L. Brazie M.S. '72, has been promoted to the rank of Lieutenant Colonel and selected as the new Director of Engineering at Detachment 3, Space Division, Buckley AFB, in Colorado.

Dr. **Elizabeth C. Stanley** Ph.D. '72 (Analytical Chemistry with Malmstadt) has been appointed Director for Institutional Research at Iowa State University in Ames, IA.

'74

Dr. **Howard J. Johnson, Jr.** Ph.D. '74 (Chemistry with Katzenellenbogen) received his B.S. in Pharmacy from the University of Texas at Austin and is now staff pharmacist with Eckerd in the Dallas area.

Dr. **Brock Siegel** Ph.D. '74 (Chemistry with Beak) has been appointed Technical Director at the Henkel Research Corporation in the San Francisco Bay Area. In his note, he mentioned that **Tom Miller** Ph.D. '76 (Chemistry with Faulkner) and **Jonathan Mielenz** Ph.D. '76 (Microbiology) were also Technical Directors in the same company.

'75

Dr. **Tony J. Beugelsdijk** Ph.D. '75 (Chemistry with Drago), currently working at Los Alamos National Laboratory, has been named to the editorial board of *Laboratory Robotics and Automation*. Dr. Beugelsdijk received a Pioneer in Laboratory Robotics Award from the International Symposium on Laboratory Robotics in 1986.

'76

Dr. **Martin A. Cohen** Ph.D. '76 (Chemistry with Brown) has been appointed Technical Director of Lydall, Inc.-Manning Division. The firm is a specialty paper manufacturer and also produces wet-laid nonwoven webs.

'77

Steven J. Martin Ph.D. '77 (Chemistry with Malmstadt) has been promoted to Associate Scientist in the Polymeric Materials Research Center of the Analytical Laboratories of the Michigan Applied Science and Technology Laboratories of The Dow Chemical Company "in recognition of his outstanding contributions in polymer characterization." Dr. Martin also serves as Adjunct Professor at Central Michigan University in Analytical Chemistry.

Professor **William P. Stewart** B.S. '77, has taken a position as Assistant Professor in the College of Agriculture at Texas A & M University, after completing his Ph.D. at the University of Arizona in Tucson.

'78

Dr. **Gary L. Turner** B.S. '78 is President of Spectral Data Services, Incorporated, a commercial NMR testing laboratory located in Champaign, IL, which offers multifield, multinuclear, solids and liquids data acquisition services.

'80

Mark Eads B.S. 1980 has taken a position as Senior Research Analyst with Heiden Associates, Economic Consultants. At Heiden he has undertaken a series of studies assessing the impact of proposed regulations on the production, importation and use of several chemicals, and has developed a software package to analyze the results.

'81

John Carl Cremer B.S. '81 has been appointed manager of applications engineering at Control Enterprises, Inc. in Savoy, IL.

'82

Dr. Montgomery M. Alger Ph.D. '82 (Chemical Engineering with Eckert) has been named manager of the Polymer Systems Project at the General Electric Research and Development Center. Before joining the Center in 1984, Dr. Alger had been assistant professor of chemical engineering at MIT.

Mark R. Simplick B.S. '82 is working for Industrial Noise Control, Inc. where he is responsible for the design and implementation of noise control systems for industrial applications.

'83

Dr. Mark W. Fox B.S. '83 has received his M.D. from the University of California at San Francisco and will enter a five-year residency program in surgery at Mayo Clinic in Rochester, MN.

John Vos B.S. '83 has been awarded a NATO Fellowship for Postdoctoral study in Europe. He has been working on his Ph.D. at the University of Delaware where he won both a University Competitive Fellowship and a Du Pont Ph.D. Fellowship.

'84

Dr. Beth Brauer Ph.D. '84 (Chemistry with Schuster) is currently being trained as an assistant editor in the Organic Division of *Chemical Abstracts*. Previous to her current position, she finished two years of postdoctoral work at Argonne National Laboratory.

Kurt Garbars B.S. '84, has received a scholarship to study electrical engineering at the University of Dayton, through the Air Force Logistics Command Reentry Program.

'85

Robert Hammer B.S. '85 received a University of Minnesota Graduate School Dissertation Fellowship for 1987/88.

Rick Mooday B.S. '85 joined the U.S. Navy, graduated from Aviation Officer's Candidate School and received his "Wings" at Pensacola, Florida. He has been temporarily assigned to Oceana Naval Air Station in Virginia Beach, VA.

'86

Nancy Nichols Ferguson B.S. '86 has taken a position at Rockwell International Space Division in Downey, CA where she is very involved in projects relating to the rebuilding of the shuttle.

KEEP IN TOUCH

Return to: Ellen Handler, Editor
SCS Alumni Newsletter
103 Noyes Laboratory
505 S. Mathews
Urbana, IL 61801

■ If you know someone who would like the newsletter and is not receiving it, please send address.

Name _____ Degree & Date _____ Major _____

Home Address: _____ Business/Univ: _____

State & Zip: _____ Your Title: _____

() Check if home address is new Address _____

() Check if business address is new State & Zip _____

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

The U. Of I. Needs Alum Help



As you can see from the Newsletter, all things go quite well with us in our research and in the achievements of our students but we are very concerned about what will happen with our state budget. This year the University of Illinois budget was cut and the School of Chemical Sciences had to absorb a 2% cut in the recurring budget. Unfortunately, without a special tax increase for education, the outlook for next year's budget is very bleak. It will mean no raises, no new instructional equipment, no remodeling of old laboratories. In addition, we shall lose faculty and staff positions.

Therefore, we want to ask those of you who live in the State of Illinois to let Illinois politicians know of your concern about the impending damage to the University of Illinois, including the School of Chemical Sciences. If you haven't already done so, please write your state representatives right away and urge them to vote for funds, which are urgently needed by your Alma Mater. Illinois is a prosperous state. It ranks 9th in per capita income but 42nd in appropriations for higher education per \$1,000 of personal income. Illinois can and must do more to protect its educational system and invest in the long term future of the state.

At the U. of I. the continuing inadequacy of funding will cause irrevocable harm. This university is truly a "jewel in the crown" of Illinois public higher education. Many years of patient effort by many devoted people have built a university that is among the finest in the nation.

SCS Alumni Newsletter
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