

# Alumni Newsletter

## School of Chemical Sciences

### Chemistry on Video

#### Illinois is first with new teaching technique



*Professor Stanley Smith and Dr. Loretta Jones view a simulated experiment on the videoscreen*

The combined talents of two Illinois chemists have produced a revolutionary idea for teaching chemistry which could lead to important new kinds of lessons for the future.

The system merges the latest in computer and video technology to create a colorful way of learning by bringing the chemistry lab vividly to the TV screen.

Professor Stanley Smith, a pioneer in teaching chemistry using computers, developed the computer-aided videodisc system with Dr. Loretta Jones, assistant director of the general chemistry program and an expert in video production. Smith says their system combines "the best features of instructional television and computer-based instruction to provide students with the ability to do simulated experiments."

TV pictures in full color (either still-frame or moving) are overlaid with computer graphics on one screen. With questions and answers at their fingertips, students can select an experiment, sit back and watch what happens. In one lesson, they learn about the reactions produced by mixing chemicals. Using the computer keyboard, the student selects a chemical and adds a liquid. On the screen, the liquid is poured into the chemical and the mixture changes color or forms a precipitate — all in "real time" as it would be in the lab. After a ten-second 'pouring' sequence, the student can stop the motion and look for as long as he needs. With 50,000 still frames for each half-hour video, every possibility can be recorded on the screen. "The advantage of this," Smith says, "is that the student can take a real phenomenon and explore it from several perspectives."

Another lesson shows what happens when a model grain elevator explodes. On the screen, grain dust is blown into a plastic tube and ignited with a spark. The explosion of the container is so fast that it blurs on the video, but a slow-motion replay (at a speed controlled by the student) shows every detail of ignition, flame and explosion.

Dr. Jones says the new technique may make chemistry courses available to many who have not had the laboratory facilities or the time, or were restricted by safety limitations. She says she has never seen any video lessons with such interactive tuition. "Videodisc lessons allow more active student learning than is usually possible in large introductory courses and can provide a valuable supplement to traditional laboratory work."

Dr. Jones has been producing instructional videotapes in chemistry since 1974 and has just completed the first videotaped course in chemistry for engineering students.

Professor Smith began teaching chemistry on the PLATO system 15 years ago. He has written computer-based chemistry textbooks and explored the use of computer games as educational tools. His programs are used at colleges and high schools throughout the country.

The researchers say that the new interactive video lessons could potentially change the way chemistry is taught, at Illinois and around the country.

In standard computer-aided instruction, the computer gives information and asks questions, the student answers and the computer responds with more information or new questions, depending on the response. Many subjects are being adapted to this form of teaching, but as yet very few fields have tried the computer-videodisc idea. According to Jones, the University of Nebraska has several lessons on videodisc, and the system is being tried in music at Delaware, for pre-laboratory preparation in chemistry at UCLA and in physics at Kansas. She says the system is "ideally suited" to chemistry — it provides immediate feedback on laboratory experiments, "like having a teacher standing there." Chemistry 100 at Illinois will be the first chemistry course to use lessons on the computer-videodisc as an integral part of the instruction.

Development of the interactive videodisc lessons was funded through Project EXCEL, a University of Illinois effort to enhance education through imaginative use of advanced computing technologies. Project EXCEL is supported through a \$12.5 million grant from International Business Machines Corp.

**ALUMNI TO MEET  
IN CHICAGO**  
details on page 12

# The Faculty

## Twelve SCS Faculty in National Academy

Professor Jiri Jonas and Professor Paul Lauterbur have been elected members of the National Academy of Sciences. Their election brings the total of Illinois Chemical Sciences faculty to receive the honor to 12. Membership is awarded only to the nation's outstanding scientists.

Professor Jonas, an Illinois faculty member since 1963, is senior staff member in the Materials Research Laboratory and has been director of the School of Chemical Sciences since 1983. He has pioneered the study of liquids at high pressure using nuclear magnetic resonance and Raman scattering techniques. Jonas' research spans the fields of chemistry, chemical engineering, physical chemistry and analytical chemistry.

Professor Lauterbur, developer of the technique of nuclear magnetic resonance imaging, will join the Illinois faculties of chemistry and medicine this autumn. He will direct a major new NMR imaging center in Champaign.

Former assistant professor of chemistry at Illinois (1959-63) Richard Earl Dickson was also elected to the National Academy of Sciences. Dickson is now director of the Molecular Biology Institute, California, and was recognized specifically for his pioneering studies on X-ray analysis of proteins.

## Richard C. Alkire Award-Winning Electrochemical Engineer



Professor Richard Alkire

Richard C. Alkire, professor of chemical engineering, has won recognition from two major societies for his unique contributions to electrochemical engineering.

This spring, Alkire received the Professional Progress Award of the American Institute of Chemical Engineers for

research activities which have broadened the field of chemical engineering. He is also the recipient of the Carl Wagner Award from The Electrochemical Society, given for interdisciplinary research and leadership in the field of electrochemical engineering.

Professor Alkire is known internationally for his analysis of complex electrochemical systems which have attracted a wide audience ranging from fundamental research scientists to development engineers. He is recognized specifically for his skill in applying chemical engineering principles to the areas of electrochemical reactor design, corrosion and electro-organic processes.

This year, Professor Alkire became one of the three youngest presidents in the 84-year history of The Electrochemical Society. He is also chairman of a national committee convened by the National Materials Advisory Board to recommend research and development priorities for saving energy using electrochemical principles and techniques.

Alkire joined the University of Illinois in 1969. He has directed over 80 graduate theses and authored more than 70 publications.

## Glittering Prizes

### Guggenheim Fellow

Gary Schuster, professor of chemistry, will support his sabbatical research at Berkeley next semester with a Guggenheim Fellowship. The grants were made this year to 270 scholars, scientists and artists chosen from among 3,548 applicants. These are annual awards made in a highly competitive environment, and go only to those whose work is considered outstanding. Dr. Schuster, whose research interests are in organic chemistry, plans to study the interaction of light with unusual substances, some of which contain metals.

Nelson J. Leonard, R.C. Fuson Professor of Chemistry at the University of Illinois, was one of the seven members on the selection committee for the Guggenheim awards.

### Sloan Fellows

Scott Denmark and Kenneth Suslick, assistant professors of chemistry, were among 90 promising young researchers nationwide to receive this year's Sloan Fellowships. Each worth \$25,000, the fellowships were established 31 years ago to recognize scholars showing the greatest potential for original research in their fields. The grants have traditionally supported young scientists setting up new laboratories and establishing independent research projects.

Dr. Denmark, 31, investigates problems in synthetic and mechanistic organic chemistry. At present, the major effort in his labs focuses on the design and development of new and improved organic reactions.

Dr. Suslick, 32, is primarily concerned with bioinorganic and organometallic chemistry. His specific areas of interest include synthetic analogs of heme proteins and the chemical effects of ultrasound.

### Presidential Young Investigators

Two researchers from the School of Chemical Sciences, Robert Scott and Scott Denmark, both assistant professors of chemistry, were selected this year by the National Science Foundation to receive Presidential Young Investigator Awards.

The grants are made to support promising young scientists and engineers at the start of their academic careers. In addi-

tion to a base grant of \$25,000, the NSF will provide up to \$37,500 a year to match contributions from industrial sources, bringing possible total support to \$100,000 annually.

Erich Bloch, director of the NSF, says the awards will "help provide for the continual production of top-flight scientists and engineers necessary to maintain American industrial vitality and technological leadership."

Professor Scott is involved in the study of metallo-enzymes which catalyze a number of different chemical reactions. Research into these biological electron transfer reactions aims to reach a better understanding of the mechanisms employed by living systems and, potentially, to use this knowledge to create synthetic energy storage systems.

Professor Denmark's research centers on the invention of new organic reactions. His work also includes stereochemistry and mechanism studies and the total synthesis of natural and unnatural products.

### Searle Scholarship

Jonathan Widom, who will join the Illinois faculty this fall, is one of 20 outstanding biomedical research investigators named as this year's Searle Scholars. Each of the scholars, chosen for demonstrated potential in doing innovative research, will receive a grant of \$180,000 to support a research program for the next three years. Funds for the program come from trusts established under the wills of Mr. and Mrs. John G. Searle. Mr. Searle was President of G.D. Searle and Co., the research-based pharmaceutical company headquartered in Skokie, Illinois.

Professor Widom's research applies methods and techniques of biophysical chemistry to a problem of fundamental importance in molecular biology: the structure of chromatin.

### Internationally. . .

John C. Bailar, Jr., emeritus professor of chemistry at Illinois, has been made an honorary member of the Japan Chemical Society.

Evan C. Melhado, professor of chemistry and history, has been awarded a Fulbright grant to collaborate with colleagues at Uppsala University, Sweden, in preparing a book of English-language essays on the Swedish chemist, Jons Jacob Berzelius (1779-1848).



Professor Gary Schuster



Professor Scott Denmark

Don Secest, professor of chemistry, is joint winner of this year's Humboldt Award from Alexander von Humboldt-Stiftung, West Germany, with Professor John D. Buckmaster of the Department of Aeronautical Engineering. The award recognizes past accomplishments in research and teaching.

### New Faculty

New faculty joining the chemistry department this year will be Paul Lauterbur, professor, from the State University of New York at Stony Brook, and Andrzej Wieckowski, associate professor, from Warsaw University. Assistant professors will be Chris Broka, from Harvard University, Jonathon Widom and Steven Zimmerman, both returning from postdoctoral fellowships at Cambridge.

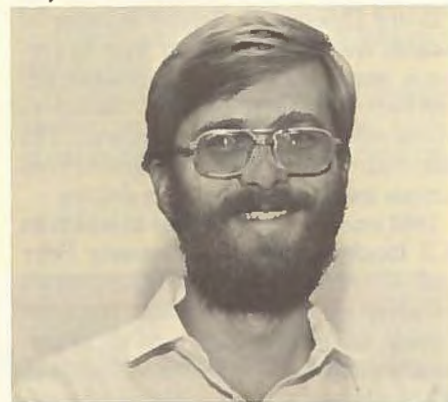
Wieckowski's research interests center on molecular electrochemistry, Zimmerman studies bioorganic and physical organic chemistry, and Broka works in synthetic organic chemistry.

(Lauterbur and Widom — see these pages.)

*photographs of Denmark, Scott and Schuster taken by Larry Kanfer*



Professor Kenneth Suslick



Professor Robert Scott

### Recognition for SCS Teachers

Graduates, undergraduates and former students of SCS gave encouraging responses last spring to a questionnaire sent out by the SCS Teaching Evaluation and Awards Committee. Of the 150 replies, 42% said they were 'satisfied' and 28% 'very satisfied' with course instruction at the School of Chemical Sciences. 56% thought the quality of instruction was either often better or consistently much better in SCS than in the rest of the university (only 10% thought it was worse).

Some enthusiastic feelings were voiced by students who already have their degrees:

"I was exceptionally well prepared for the future after completing all my coursework in the School of Chemical Sciences. I'll always be thankful to all my profs;"  
". . . let me just say that the department is right on track with the needs of their students;"

contd.

One of the purposes of the questionnaires was to identify the School's most outstanding instructors. Based on the comments received and on the computer-scored evaluations done in current classes, four faculty were selected to receive SCS Awards for Excellence in Teaching in 1984. They are: Dr. John Clark, biochemistry, Dr. Jonathan Higdon, chemical engineering, Dr. Nelson Leonard, chemistry and biochemistry, and Dr. Steven Zumdahl, general chemistry. Teaching award recipients in 1983 were Dr. Peter Beak and Dr. James Lisy, and, in 1982, Dr. Richard Alkire and Dr. Clifford Dykstra. A greater number of awards was given last year than in previous years, because the committee felt that there were more excellent instructors whose efforts should be recognized. The cash awards are supported by grants from various industrial and private donors.

1984 was also the first year in which an SCS faculty member — Professor Peter Beak — received one of the four awards for undergraduate instruction from the College of Liberal Arts and Sciences. Beak's students describe his lecturing as clear, concise and easy to follow; he was able to present "intricate concepts of organic chemistry in a simplified way." Rankings based on in-class evaluations show that Professor Beak has a long track record as one of the most appreciated instructors in the School. He is the first SCS faculty member to receive college or campus recognition since Professor Zumdahl in 1981 and Professor Clark in 1977.

### *Award to Zumdahl*

Dr. Steven Zumdahl, lecturer and associate director of general chemistry, has been selected to receive one of the 1985 LAS Awards for Distinguished Teaching for his work in the general chemistry courses, Chem 107 and 108. The awards are given to only five faculty in the college each year.

Dr. Zumdahl was described as one who "has captured the imagination of hundreds of students whom he has introduced to chemistry." His students have commented that he is "just a fantastic teacher," and "an excellent and understanding lecturer."

Zumdahl has already received the campus award for Excellence in Undergraduate Teaching (1981) and the SCS Teaching Award (1979, 1984).

Dr. Zumdahl will become director of the general chemistry program in the fall.

## Stonybrook Star Chooses Illinois



*Professor Paul C. Lauterbur*

Paul Lauterbur, professor of chemistry at the State University of New York at Stonybrook, joins the Illinois chemistry faculty this fall.

A decade ago, Professor Lauterbur pioneered the use of nuclear magnetic resonance (NMR) to create images, a technique using magnetic fields to scan the body, which many believe will revolutionize medical theory and practice. The discovery has won him a number of prestigious awards, including the 1984 Albert Lasker Clinical Research Award and one of the 3 prestigious General Motors Cancer Research Awards for 1985, the Charles F. Kettering Prize in diagnosis or treatment.

His decision to join the faculties of chemistry and medicine at Urbana-Champaign ended a five-year pursuit by Illinois pathologist and clinical professor, Ben Williams and aggressive recruiters from the University of Illinois. Offering a package which included new equipment and support staff to enable Lauterbur to continue and expand his work, University of Illinois officials have promised to make the U. of I. a major center for NMR imaging research.

Much of Lauterbur's equipment in the graduate chemistry building at Stonybrook had been bought in the early 1970s or hand made by students. The University of Illinois has undertaken to establish an NMR imaging research center at Mercy Hospital, Urbana, to be headed by Lauterbur who will have exclusive use of several new NMR imaging devices. Much of the financing for this expensive project (a clinical NMR

*photo of Lauterbur by Larry Kanfer*

imaging machine costs \$2 million) came from private funds — mostly the Mercy Hospital Board of Trustees.

The technique of NMR imaging, for which Professor Lauterbur is renowned, has been carried over from the NMR research done for many years on university campuses, including Urbana-Champaign. Nuclei in the body, Lauterbur says, like to line up with the field of a large magnet. With radio waves of the right frequency, signals can be transmitted and unscrambled by a computer to create an image on a screen of water molecules in the body, and of how they move and distribute themselves in normal and damaged tissues. In addition to distinguishing cancerous tissue, such images also can diagnose hemorrhages, stroke, structural heart abnormalities, atherosclerosis, spinal disk injuries, and kidney and liver diseases.

The excitement of NMR imaging lies in its versatility, Lauterbur says. The technique has endless new applications in both medical and non-medical fields.

Lauterbur leaves New York after 22 years as a chemist at Stonybrook. "Sometimes," he says, "people move for no very good reason other than that they've been in a place for a very long time." His decision to come to Illinois was based largely on the superior facilities offered for him and his wife, Joan Dawson, herself a highly regarded physiologist who will hold appointments in biophysics and physiology, and on the quality of faculty and students at Illinois. Most of his students here will be chemists who, Lauterbur says, "can do anything if they put their minds to it."

### **"Urbana dominates graduate rankings"**

An article in *Chemical and Engineering News* this spring reported that "in terms of sheer numbers of new chemistry graduates, 1983-84 was a big academic year for the University of Illinois, Urbana-Champaign, a school long a major force in chemical education."

The latest annual report from the American Chemical Society's Committee on Professional Training shows that SCS produced more chemistry graduates with bachelor's degrees than any other institution in the U.S. The School also ranked second in production of new Ph.D. chemists and 19th in the output of masters chemistry graduates.

Illinois has been the largest producer of chemistry Ph.D. graduates for eight of the past 11 years.

## Illinois Inventors

### Joseph Burckhalter

*Joe Burckhalter, chemistry M.S. alumnus, 1938, is the inventor of FITC (fluorescein isothiocyanate), a green chemical dye capable of identifying virtually any substance which can produce antibodies. Its effect on the diagnosis of infectious diseases, on cancer and on virtually any problem involving antibodies, has been inestimable.*

*Joe Burckhalter, former Professor of Medicinal Chemistry at the University of Kansas and then at the University of Michigan, says his accomplishment is "a mixed bag, for the more important the work becomes, the more credit goes to Illinois, Fuson and Price for providing the proper environment." Here, Burckhalter writes about his discovery in the late 1950s and the university training which made it possible.*

"While at Illinois, I was privileged to hear Fuson's lectures in qualitative organic analysis and to have Charles C. Price, newly arrived from Harvard as an assistant professor, as a laboratory instructor. Price gave me, for identification, a water-soluble mixture of compounds, one of which I suspected to be methanol, but, due to the instability of phenylisocyanates in water, I isolated only the insoluble urea instead of the identifying urethan. However, I found that phenylisothiocyanate gave the desired thiourethan because phenylisocyanate reacts more readily with water than phenylisothiocyanate.

"Twenty years later, when I was teaching and researching at the University of Kansas, Theodore Metcalf, a colleague in microbiology, telephoned me hoping that I could help him to prepare pure fluorescein isocyanate (FIC), a potentially important fluorescent antibody labelling agent which had been introduced by A.H.Coons and his colleagues at Harvard. For successful results, biologists were compelled to make FIC by causing fluorescein amine to react with the highly toxic war gas phosgene and to use the product at once in their labelling experiments with various antibodies, otherwise the insoluble fluorescein urea was obtained. I insisted that I would have nothing to do with FIC and strongly suggested that we make fluorescein isothiocyanate (FITC). A year later, when I returned from a sabbatical year in Germany, Rapter Laboratories made avail-

able the liquid thiophosgene and at once we were able to make the highly stable FITC.

"With the invention of FITC, any infectious disease, or any condition caused by the entry of many foreign materials into the body, could potentially be diagnosed by means of a single chemical dye. Any antigen entering the body will produce a specific antibody which complexes with the same antigen if it again invades the body, thus preventing disease in the case of a pathogenic organism. The specific antibody, a proteinaceous globulin, can be isolated and, because of terminal amino groups, will react with FITC to form covalently bonded thioureas. The labelled antibody is stored in a refriger-

ator until called on for positive and rapid identification of a suspected antigen with which it alone will form an antigen-antibody complex, identifiable through its intense green fluorescence by means of a fluorescence microscope.

FITC can distinguish between different strains of streptococci and has proved infallible in tests for syphilis. It is used as the specific means of diagnosis in Legionnaire's disease and, recently, in tests for differentiating promptly between cancerous and non-cancerous lesions of plasma cells."

*FITC also led the way for the development of many other molecular probes of use in medicine — Editorial postscript.*

### E.J. Corey Receives Honorary Degree



Professor E. J. Corey

The University of Illinois awarded an honorary degree this summer to one of its most prestigious former faculty, Elias J. Corey, professor of chemistry at Harvard University, and one of today's leading figures in synthetic organic chemistry.

E.J. Corey joined the Illinois chemistry faculty in 1951, as a 23-year-old Ph.D. graduate from M.I.T. Five years later, he was promoted directly from the rank of assistant professor to professor and, at the age of 28, beat a record set by Roger Adams who became a professor at 30. In 1959, Speed Marvel wrote of

him "the total of Dr. Corey's achievements to the age of 31 represents the widest range and the greatest individual virtuosity in chemical research in the United States today." Professor Corey's honorary degree from Illinois brings his total to six (he has also received honorary degrees from Harvard, Chicago, Hofstra, Colby and Oxford.)

E.J. Corey's contributions to organic chemistry have been of a truly fundamental nature. He has initiated many new areas of research and provided elegant solutions to long-standing chemical problems. His explicit formulation of strategies and problem-solving methods of organic syntheses have revolutionized the planned syntheses of organic compounds. Corey has also designed and discovered new reagents for organic synthesis that have become the standard tools in laboratories and in industry.

Professor Corey's original thinking and imaginative approach to chemistry have earned him unquestioned eminence in the chemical community. He is the winner of over 25 major awards, including the ACS Award in Pure Chemistry, the Fritzsche Award, the Gibbs Award, the Arthur C. Cope Award and the Dickson Prize in Science from Carnegie Mellon. Corey is a member of the National Academy of Sciences and a fellow of the American Academy of Arts and Sciences.

# Profile

## Professor Herbert E. Carter: Forty-one years at Illinois

Herbert E. Carter, emeritus professor of chemistry, former Head of the Department of Chemistry and Chemical Engineering and one-time Vice-Chancellor for Academic Affairs, didn't plan to spend 41 years at Illinois — it just worked out that way. He wouldn't recommend "growing up" from graduate to faculty in the same department, but, in retrospect, the circumstances were right.

In college at De Pauw, Indiana, Herbert Carter ran on the track team, and often came to the Illinois campus for relay events. On one such outing, he wandered over to the Chemistry Building to introduce himself to Speed Marvel, who took him to meet Bob Fuson. By the time he got back to the Armory, Carter says "there was no question of where I wanted to go."

Marvel "radiated warmth", and attracted Carter to organic chemistry in spite of his plans to be a biochemist. He turned down an offer at MIT to come to Illinois, and, in 1943, graduated with a Ph.D. degree in organic chemistry and "a strong minor in biochemistry." In his final year, when Carter was "T.A.ing" a course in organic chemistry, Will Rose asked him if he wanted to stay on and do some synthetic work on the newly identified amino acid, threonine. "It was the only thing he ever asked me to do, but it couldn't possibly have had a greater influence on my life."

It was this work which led to Carter's later research on sphingosine and related lipids, and to his participation in the penicillin program during the war.

In the field of biochemistry, Carter made significant contributions to the knowledge of the chemistry of lipids. His research program at Illinois eventually involved a total of 80 Ph.D. students, 30 masters degree students and produced 130 research papers in various chemical and biochemical journals.

In his first few years on the staff at Illinois, Carter had five graduate students, one of whom, Handler, later became President of the National Academy of Sciences. Of the other four, two became heads of departments, one a president of a medical college and the fourth headed antibiotic production at the Bristol Labs. After his first term as research advisor, Carter "thought academic life must be a cinch." He says the



Professor Herbert Carter in 1985

chemistry department at Illinois has always attracted first rate students because "they know that if they come, people will pay attention to them." It is a policy that was fostered by Marvel, Fuson and Shriver who, Carter says, were "devoted to advancing the welfare of chemists as well as of chemistry."

Every year, Rose would say to Carter "well, I suppose you'll be moving on next year," until, finally, after 10 years, they stopped talking about it. In those days, the two of them constituted the entire biochemistry division at Illinois. They were an effective team in that two better teachers and investigators have rarely been found. According to Carter, he and Rose were a perfect complement — Rose was thorough and careful, he was "slap-happy." Working with Dr. Rose was a tremendous learning experience for Carter. "I've loved him all my life, although he was a stern taskmaster. At times he let me have it, and I deserved it." A fluent Scotsman with a terrific vocabulary, Rose was "a magnificent teacher" who really made things come to life.

Still, Carter says it might have been a restrictive life without his introduction, in 1939, to the Midwest Antibiotic Group. Those war years were "something of an external sabbatical". Carter spend a good deal of his time travelling the Midwest between pharmaceutical houses, as a consultant in the crisis effort to develop penicillin, and continued to teach classes in biochemistry on Mondays and Tuesdays.

The war activities brought Dr. Carter into contact with the national and international scientific community, and in subsequent years, he served on many scientific bodies and committees, as President of the American Society of Biological Chemists in 1957, and later on the American Chemical Society's Board of Directors. He was chairman of the ACS Committee on Professional Training and a founding member of the Committee on Chemistry and Public Affairs. For the National Institutes of Health, Carter helped establish the Biochemistry Training Grant Committee. In 1953, he was elected to the National Academy of Sciences, later serving on the Council on several committees and as chairman of the section on biochemistry. In 1964, he was appointed to the National Science Board where he served for 12 years, four of them as chairman.

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### *"shortest lived divisional head in history"*

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Throughout his career, Carter says he has always seemed to arrive on the scene at a time of transition. At Illinois, he was the "shortest lived divisional head in history." It was 1953, the year in which Professors Clark, Marvel, Rodebush and Rose gave up the divisional headships to become research professors. Carter assumed duties as head of biochemistry, and, a year later, took over from Roger Adams the leadership of the department of chemistry and chemical engineering. Carter later wrote: "having with some reluctance and substantial apprehension agreed in early 1954 to accept the headship, I had the wonderful experience of weekly conferences with the Chief; he distilled for me the essence of his philosophy and practices in his thirty years as head of the department." Carter says that Adams would often stop in to see him in the early mornings but never discussed departmental problems, even though "it must have been a terrific strain on him to see all the mistakes we were making." But he adds, "I entered *his* office at my own hazard."

A succession of retirements in following years meant the loss of many of the great chemists of the Adams era — including Rose, Rodebush, Adams, Englis,

Audrieth, Marvel, Fuson and Phipps. It was also a period of extensive recruiting, when the number of graduate students almost doubled in 12 years.

Things could have gone rapidly downhill, Dr. Carter says, if it hadn't been for the open door policy of easy interaction between the staff which allowed men of very different persuasions to work well together. He drew great strength from colleagues like Harry Drickamer, Nelson Leonard and John Bailar. There was also some advantage to being a biochemist, Carter says, because he was sometimes able to reconcile differences between the chemistry divisions. He admits, too, that he has always liked people, and loves to "sit and harangue about problems."

Professor Carter continued to teach for two years after he took over the headship until finally coming to terms with the decision not to go back to research. Once decided, Carter had no regrets — "I've never looked back over my shoulder much" — and has realized that, after all, "there are satisfactions in administration, they just come much more slowly." It's not the same as going down to the lab every morning, but life in the labs can be a narrow environment, he says, and "in those very early days, we only had one outside speaker or so a month." Carter found he had "some competence in dealing with people and in persuading them to do things," combined with an understanding of what quality is, and how to develop and nurture it. Besides, you only have to look around to see all the jobs that need doing — "sitting still is for the birds."

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*"I've never looked back over my shoulder much"*

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At most points in his life, Dr. Carter seems to have had an average of two full time jobs. As Department Head, he took on a second position of Acting Dean of the Graduate College from 1963-65. One of the satisfactions was in getting rid of some of the more rigid restrictions on the whole college operation, particularly on the graduate curriculum which he felt were "a big mistake; by the time they're in the graduate school, students should have the maximum freedom you can give them."

Roger Adams  
Laboratory  
in the 1950s.



Appointed by Jack Peltason as the university's first Vice Chancellor of Academic Affairs in 1967, Carter relinquished the headship of chemistry and chemical engineering for "a few rooms in the English Building and no staff." He still gets a thrill when he visits the new offices to see some of his starter team still around. That first year, "I held court three mornings a week at 7:30, and gradually we got things organized." The planning program they set up involved getting every department in the university to think about their own long-range planning. For the first time, Carter and crew introduced new ways of having faculty contribute to budget-making decisions. That's what he enjoyed most, Carter says, "seeing things happen." The long-range plan they came up with is "still around somewhere."

Nevertheless, by the end of the 1960s, even Dr. Carter was "beginning to get a little tired of it." He had been head of chemistry and chemical engineering for 13 years (now, he says "no-one should be head for longer than five years unless there's a major review") and in higher administration for six. In the end, he says, administration becomes "damn frustrating — you spend hours preventing something happening that should never have had a possibility of happening."

Carter's continued involvement in the National Science Board gave him a chance to escape occasionally to Arizona, where the Board met every other year in Tuscon as part of its responsibility for the Kitt Peak Observatory ("even a stupid biochemist could tell the difference between Tuscon airport in Febru-

ary and O'Hare in February.") He and Betty had got to know people there, and in 1971, University of Arizona colleagues asked him to join them, Carter claims "while I still had some energy left." The idea of joining Arizona as an elder statesman appealed to him. Carter says he wouldn't have enjoyed retiring to take a

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*"there are satisfactions in administration, they just come much more slowly"*

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back seat at Illinois, but in Tuscon, he could use his experience in the University of Arizona's struggle to become a major university. Carter's specialty at Arizona has been developing interdisciplinary programs and building a good biochemistry department. In 1981, he retired to become a research fellow in the Office of Arid Lands Studies and now serves as special assistant to the Vice-President for Research. Of all the many honors he has received, Carter values most his honorary degrees from the University of Illinois, and from the University of Indiana, his mother's alma mater.

Any nostalgic twinges he and Betty felt for the Mid-West have been somewhat assuaged by the summer home they keep in Northern Michigan. When he stopped in Urbana this summer, Herbert Carter was tanned, fit, talkative and not looking much older than when he left fourteen years ago. At the age of 74, he sometimes considers retiring for the third time.

# The Alumni

## Research Success for Jack Marvel



Marvel with colleague Melvin Rueppel

Research leading to a better understanding of pesticide metabolism won major recognition last year for John T. Marvel, B.S. alumnus and son of Carl (Speed) Marvel, emeritus professor of chemistry. John Marvel, general manager of the research division of Monsanto Agricultural Products Company, shares one of the two prestigious Charles A. Thomas and Carroll A. Hochwalt Awards from Monsanto with colleague Melvin L. Rueppel,

## Allan Hay, Chemical Pioneer

Allan S. Hay, Ph.D. 1955 (chemistry), was recognized this year as an outstanding innovator by the American Institute of Chemists' Chemical Pioneer Award. He was one of four scientists honored for contributions which have had a major impact on advances in chemical science and industry or the chemical profession.

Dr. Hay received the award specifically for his pioneering discovery of polymerization by oxidative coupling and

## Two More Alumni in National Academy

The National Academy of Sciences elects to membership only the top scientists in the nation. Alumnus George Parshall was inducted into the society at the annual meeting in Washington D.C. in April. Mary Dell Chilton was elected to receive membership next spring.

George Parshall, Ph.D. 1954 (chemistry), a research scientist at DuPont, is one of the few non-academic scientists granted membership by the academy. He was elected specifically for his original research on transition metal chemistry. Parshall holds 18 patents and has written two books.

director of process technology. The award carries \$25,000 in cash and a silver medallion.

The two scientists have developed analytical techniques to quantitatively identify metabolites resulting from applications of herbicides to commercial crops. Their research was triggered by a dissatisfaction with enormously time-consuming and expensive methods for testing herbicides on crops which were previously in use at the Monsanto labs. The "brute force" method, as Marvel calls it, required treating and harvesting acres of crops, which would be partitioned down for animal feeding studies. The test period usually lasted six months and cost \$100,000 a month in 1967.

The new technique makes it possible to determine the structures of metabolites at use levels of about one thousandth that of the least abundant natural plant materials. Marvel and Rueppel have set new standards for this kind of work and permitted the solving of complex metabolism problems that were previously impossible to solve.

the large family of high performance, low cost, and easy processing polymers that have resulted from his invention.

Hay has been research and development manager of Chemical Laboratories at General Electric since 1980 and is also adjunct professor of polymer science and engineering at the University of Massachusetts, Amherst. He holds 55 U.S. patents and is the author of more than 50 publications.

Mary Dell Chilton, B.S. 1960 (chemistry), received her Ph.D. at the University of Washington and taught there for several years. She is now executive director of Agricultural Biotechnology at Ciba-Geigy, North Carolina. Chilton was elected for her work on plant DNA, specifically for research which provided proof of direct transfer and incorporation of DNA from the genome of one organism to that of another. The nomination said Chilton's work has transformed the genetic engineering of plants from science fiction to science.

## Karl Folkers Wins Highest ACS Award

Karl Folkers, B.S. 1928 (organic chemistry), has been named the 1986 recipient of the Priestley Medal, the American Chemical Society's highest honor.

Folkers is Ashbel Smith Professor and director of the Institute for Biomedical Research at the University of Texas. In 50 years of scientific research, he has added immeasurably to our basic knowledge of life processes. Folkers' most important work, on the role of vitamins in human disease, is a success story of research which bridges the gap between chemistry and medicine.

Folkers earned his Ph.D. in organic chemistry at the University of Wisconsin in 1931. After a postdoctoral fellowship at Yale, he began work at the Pure Research Labs at Merck and Company. Over the next 29 years, Folkers was involved in the isolation, characterization, and synthesis of many important vitamins, antibiotics and hormones. In 1939, he and coworkers were the first to describe the structure of vitamin B<sub>6</sub> and to synthesize the compound. His group also isolated and characterized streptomycin and, later, vitamin B<sub>12</sub>. At the time, the work on vitamin B<sub>12</sub> was considered 'basic science' — it was known only to treat pernicious anemia, a very rare disease. For Folkers, the research was critical because B<sub>12</sub> was a vitamin essential to life. It was later proved to be the same compound as the 'animal protein factor' and its use revolutionized the raising of livestock and poultry.

In 1963, Folkers became president and chief executive officer of Stanford Research Institute. In addition to his research, he reorganized and increased staff, revenue, research and development areas and facilities.

Two of his most important research projects, which Folkers took with him to the University of Texas, have involved vitamin B<sub>6</sub> and coenzyme Q<sub>10</sub>. He began work on coenzyme Q<sub>10</sub> 20 years ago and believes it will ultimately be used to treat heart disease. Clinical studies of B<sub>6</sub> have suggested that a deficiency of the vitamin could play a role in a wide range of human medical disorders.

The Priestley Award is the latest in a long list of honors Folkers has received during a distinguished career.



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## In Memoriam

**Robert Whitney**, Ph.D. 1944 (physical chemistry), died in April of this year at the age of 73. Whitney began work as a research chemist for the Dean Milk Co. and returned to the University of Illinois in 1946 as associate professor of dairy technology. He remained on the faculty until his retirement in 1982. Dr. Whitney was an internationally recognized authority on the physical chemistry of milk proteins. He was a pioneer in the isolation and identification of chemical compounds responsible for off-flavors in food.

Dr. Whitney died as a result of injuries received in a car accident. His wife, who was also in the accident, is recovering.

**Stanley Widger**, B.S. alumnus 1933, died last July of lung cancer. He was 74. Dr. Widger earned his M.D. degree from the University of Rochester in 1937 and, during World War II, was posted to the Pacific with a portable surgical hospital unit. The photographs he took, of the local people and of the unit at work and at play, remained unprinted for 40 years until months before his death. In the early spring of 1984, Widger and his daughter

Nancy printed the photos by hand at his home in Rochester, New York. The rolls of wartime film provide a legacy of memories from the life of a remarkable and sensitive man.

**Richard F. Phillips** died on January 28, 1985. Dr. Phillips received his Ph.D. under the direction of Professor Roger Adams, and graduated in 1942. He was then employed by Merck and Company, Rahway, New Jersey, where he continued to work until cancer forced his retirement late in 1984.

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## Alumni News

### 1925

**Sheo-Hen Li**, Ph.D. 1925 (chemical engineering), retired in 1978 as president of the Zhejiang Institute of Technology in China. From 1927-1960, he worked at Zhejiang University as professor of chemical engineering, head of the department, dean of the College of Engineering and, finally, vice-president of the university.

### 1929

**C.D. Zannis**, B.S. 1929 (chemistry) retired in 1982 (at the age of 80) from his successful cosmetic and pharmaceutical business in Athens, Greece. He visited the university in 1983, after an absence of 51 years.

**Edwin R. Littman**, Ph.D. 1929 (organic chemistry) retired from Enjay Chemical Company, New Jersey, 23 years ago and has become an expert in several areas dealing with the application of chemistry to archeology. He is still active in archeology "with a pen instead of a pick."

### 1932

**James M. Straley**, B.S. 1932 (chemical engineering) (Ph.D. Iowa State), holder of more than a hundred patents on dyes for textile materials, was named the 1977 recipient of the Olney Medal, AATCC's highest award for achievement in textile chemistry. Among his many accomplishments as a researcher is the discovery of C.I. Disperse Blue 27 and the development of related dyes including lightfast,

washfast, sublimation fast dyes for permanent press polyesters, and a series of new reds for polyamides. Straley is retired and living in Kingsport, Tennessee.

**Charles H. Fisher**, Ph.D. 1932 (organic chemistry), has retired as chemistry professor from Roanoke College, Virginia, but still teaches on an adjunct basis.

### 1935

**J. Wesley Floreth**, B.S. 1935 (chemical engineering), received the 1984 Distinguished Service Award from the American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. Floreth is a former director and chairman of ASHRAE Region Seven, including parts of Florida, Georgia, and Puerto Rico.

### 1936

**Winston J. Wayne**, B.S. 1936 (organic chemistry), retired in 1980 from the DuPont Company after long service as a research organic chemist. He lives in Wilmington, Delaware.

### 1939

**William A. Jacob**, B.S. 1939 (chemistry), a former vice president of Operating Services at Anderson, Clayton and Co., is retired and living in Houston, Texas.

### 1942

**Maury Ward**, Ph.D. 1942 (organic chemistry), retired in 1977 from a 35-year

career at DuPont, and has recently turned his talents to research in Alaska as a naturalist and ecologist. For the last two years, Ward has lived on the remote west coast of Alaska in Kipnuk, observing traditional Yupik Eskimo ways.

**Charles L. Rulfs**, B.S. 1942 (chemistry) (Ph.D. Purdue), has retired as professor of chemistry at the University of Michigan. His research activity for many years was in the areas of polarography and the chemistry of rhenium and technetium. He served as a consultant to the Los Alamos Laboratories for several decades. In retirement, his interests combine paper chemistry and hand-bookbinding.

### 1944

**Rudolph D. Deanin**, M.S. 1944 (organic chemistry), is professor of plastics engineering at the University of Lowell, Massachusetts, where he founded and directs the graduate programs in plastics engineering. Deanin won the Society of Plastics Engineers 1985 Award for Outstanding Achievement in Plastics Education.

**Wilmer R. Manning**, Ph.D. 1944 (chemical engineering), retired from Union Carbide in 1983, and is now an engineering consultant.

### 1951

**Lun Hsiao**, Ph.D. 1951 (chemistry), is Chairman, Science and Technology Committee, Institute of Atomic Energy at the Chinese Academy of Sciences in Beijing, China. He is also President of the Isotope Society of China.

## 1953

**Harold M. Foster**, Ph.D. 1953 (organic chemistry), has been appointed assistant director for program development and coordination at Southern Illinois University-Carbondale's Coal Extraction and Utilization Research Center. Dr. Foster holds 26 patents.

## 1957

**Kenneth D. Walter**, M.S. 1957 (chemical engineering), this year accepted a position as vice president of production and engineering at A.L. Laboratories, Illinois. He was formerly a production manager at Hoffman La Roche.

## 1959

**A. Wallace Cordes**, Ph.D. 1959 (chemistry), is a professor of chemistry at the University of Arkansas. Last year, he was named chairman of the department.

## 1961

**Donald R. Hartter**, B.S. 1961 (chemistry) (Ph.D. Berkeley), works on new product development and acquisitions at Air Products and Chemicals, Inc., Pennsylvania.

## 1965

**Haskell V. Hart**, B.S. 1965 (chemical engineering), works at Shell Development Company, in Houston, Texas, on the exploration and production research and development of X-Ray and electron diffraction.

**Dr. Baldev S. Manhas**, postdoctoral research associate in inorganic chemistry from 1964-65, is now a professor at Punjabi University in India.

## 1966

**Barry E. Galbraith**, Ph.D. 1966 (organic chemistry), is now a technical information specialist for Union Carbide Corporation in New York state. He served for 18 years as a research officer and technical information officer for the Alberta Research Council in Canada.

## 1968

**David J.W. Goon**, Ph.D. 1968 (organic chemistry) is an assistant professor of chemistry at the University of Wisconsin.

**Donald Jon Bednarczyk**, Ph.D. 1968 (biochemistry), works as a clinical chemist at St. Paul's Hospital, Vancouver, B.C.

**Andrew T. Zander**, B.S. 1968 (chemistry) (1976 Ph.D. of the University of Maryland), is a senior staff engineer at Perkin-Elmer's Spectroscopy Division in Connecticut. His research concerns the design and development of new optical spectroscopic instrumentation.

## 1970

**Harlan J. Richards**, B.S. 1970 (chemical engineering), has been promoted to plant manager of A.E. Staley Manufacturing Company's Lafayette, Indiana, plant.

## 1971

**Dr. J.N.L. Connor** was a research associate in the department of chemistry from 1969-71, when he returned to England to teach at the University of Manchester, department of chemistry. In 1983, Connor was given the Royal Society of Chemistry Award in Theoretical Chemistry "for his work on the quantal, semi-classical and classical theory of molecular collisions in gases and its application to the interpretation of inelastic and reactive scattering."

**Lucy Hall Novak**, Ph.D. 1971 (chemistry), works on productivity improvement for oil/gas wells at Exxon Production Research Company in Texas.

**David P. Novak**, Ph.D. 1971 (chemistry), is involved with polypropylene product research and development for Exxon Chemical Company, Chemical Technology Center in Texas.

**Karel A.J. Snoble**, B.S. 1971 (organic chemistry), has been named research leader in the Inorganic Materials and Catalysis Laboratory of Dow Central Research, Dow Chemical USA, Midland, Michigan.

## 1972

**Bennie R. Ware**, Ph.D. 1972 (chemistry), has been appointed William R. Kenan, Jr. Professor of Science in the chemistry department of Syracuse University.

**Ronald P. Taylor**, Ph.D. 1972 (organic chemistry) has been made a section manager in the research and development of polyurethanes for Mobay Chemical Corporation.

**Christos Georgakis**, M.S. 1972 (chemical engineering), has been named associate professor of chemical engineering at Lehigh University. A specialist in chemical reactor engineering, chemical process modeling, optimization, dynamics and control, he was formerly associate professor of chemical engineering at MIT. He has a doctorate in chemical engineering from the University of Minnesota.

**Karl Olander**, Ph.D. 1972 (organic chemistry), has been promoted to director of polymer products research at American Cyanamid, in Connecticut. Dr. Olander holds 25 patents in the field of polymerization of thermoplastics.

## 1973

**Hasuck Kim**, Ph.D. 1973 (analytical chemistry), now teaches at Seoul National University in Korea.

**E. Mark Paine**, M.S. 1973 (chemistry), works for John Crane-Houdaille Inc., on the research and development of rubber chemistry for sealing products.

**Dan Covey**, Ph.D. 1973 (chemistry), was recently elected to his second term as chemistry department co-chairman, in charge of administrative affairs, at L.A. Pierce College, Los Angeles, California.

## 1975

**Dr. Katsumi Kakinuma**, a postdoctoral research associate from 1972-75, is a researcher at the Tokyo Institute of Technology, Japan.

**Joseph W. Alper**, B.S. 1975 (chemistry), won the 1984 James T. Grady-James H. Stack Award for Interpreting Chemistry for the Public. The American Chemical Society award was given for his ability to combine extensive training in chemistry and biochemistry with writing skills to bring chemistry to a wide audience. Alper is a freelance science writer.

## 1976

**Philip L. Gravel**, Ph.D. 1976 (organic chemistry), was recently promoted to the position of senior research chemist in Amoco Chemical's Research and Development at Naperville, Illinois.

**William R. Martin**, B.S. 1976 (chemical engineering), is a senior engineer involved in the product development of ABS polymers at Borg Warner Chemicals, Washington, West Virginia.

**David A. Ley**, Ph.D. 1976 (chemistry), has been promoted to technical director, Paper Chemicals Research and Technical Service at American Cyanamid, Connecticut.

## 1977

**Thomas E. Dudman**, B.S. 1977 (chemistry), received his degree in chemical engineering from Auburn University, Alabama.

**Lynne M. Parr**, M.S. 1977 (chemistry), has recently been promoted to manager of select industries for Technical Service and Product Development at Dow Corning Corporation, Michigan.

## 1978

**Bruce D. Allison**, Ph.D. 1978 (organic chemistry), is an associate professor of chemistry at the Rose-Hulman Institute of Technology in Indiana.

**John McCracken**, B.S. 1978 (physical chemistry), is doing research using pulsed EPR spectroscopy at the Albert Einstein College of Medicine, New York.

**William R. Kramer**, B.S. 1978 (chemical engineering), was recently promoted to plant manager of Bordon Chemical Company's Kent, Washington, facility.

## 1980

**Dana Andre d'Avignon**, Ph.D. 1980 (inorganic chemistry), recently accepted a position at Washington University in St. Louis as director of the chemistry department's NMR facility.

## 1981

**Jack Euske**, B.S. 1981 (chemistry), is a graduate fellow in organic synthesis at Southern Illinois University.

## 1982

**Kenneth Jaconetty**, B.S. 1982 (chemical engineering), is a patent examiner for the U.S. Patent and Trademark Office in Virginia.

**Maryam L. Dachniwskyj**, B.S. 1982 (chemistry), is currently enrolled part-time in the graduate program in chemistry at Roosevelt University in Chicago in pursuit of a Master's degree.

**Bradley W. Soren**, B.S. 1982 (chemical engineering), works for Westinghouse in semiconductor-process development at Severna Park, Maryland.

## 1983

**Michael A. Malachowski**, Ph.D. 1983 (chemical engineering), is a research engineer in reservoir modeling for enhanced oil recovery at Amoco Production Research Company, Tulsa, Oklahoma.

## 1984

**Walter Zurawsky**, Ph.D. 1984 (chemical engineering), is a materials research scientist at AT and T Technologies.

**James Edward Hensly, Jr.**, B.S. 1984 (chemical engineering), works in technical services of the catalyst department at American Cyanamid Company in Indiana.

## KEEP IN TOUCH

Return to: Sara Arndt, Editor  
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## ALUMNI TO MEET IN CHICAGO

All SCS alumni are invited to the traditional social hour for faculty, alumni and friends at the September meeting of the American Chemical Society in Chicago.

The party will be on Tuesday, September 10th, 1985, from 5:30-7:30 pm, in the Lincolnshire Room of the Chicago Marriott on Michigan Avenue. The Marriott Hotel is only a few blocks walk or taxi ride from the Hyatt Regency, the

ACS headquarters hotel for this meeting, which will run from September 8-13, 1985.

If you are not planning to attend the meeting, but can be in Chicago on September 10th, please join us. This is a time to renew old friendships, meet new faculty and alumni, and re-live the spirit of Illinois. See you in Chicago.



## Chemistry Symposium

The Dreyfus Symposium on the Chemistry and Physics of Surfaces and Clusters will draw a team of experts from all over the U.S. to the Illinois campus this fall.

The symposium, to be held Friday, October 11, and Saturday, October 12, will cover the chemistry and related physical phenomena occurring at surfaces or on clusters, including catalysis. State-of-the-art experimental techniques and theoretical methods will be discussed in an exciting, in-depth series of lectures.

For additional information, write to: The Dreyfus Symposium, 103 Noyes Lab, 505 S. Mathews Ave., Urbana, IL 61801.

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