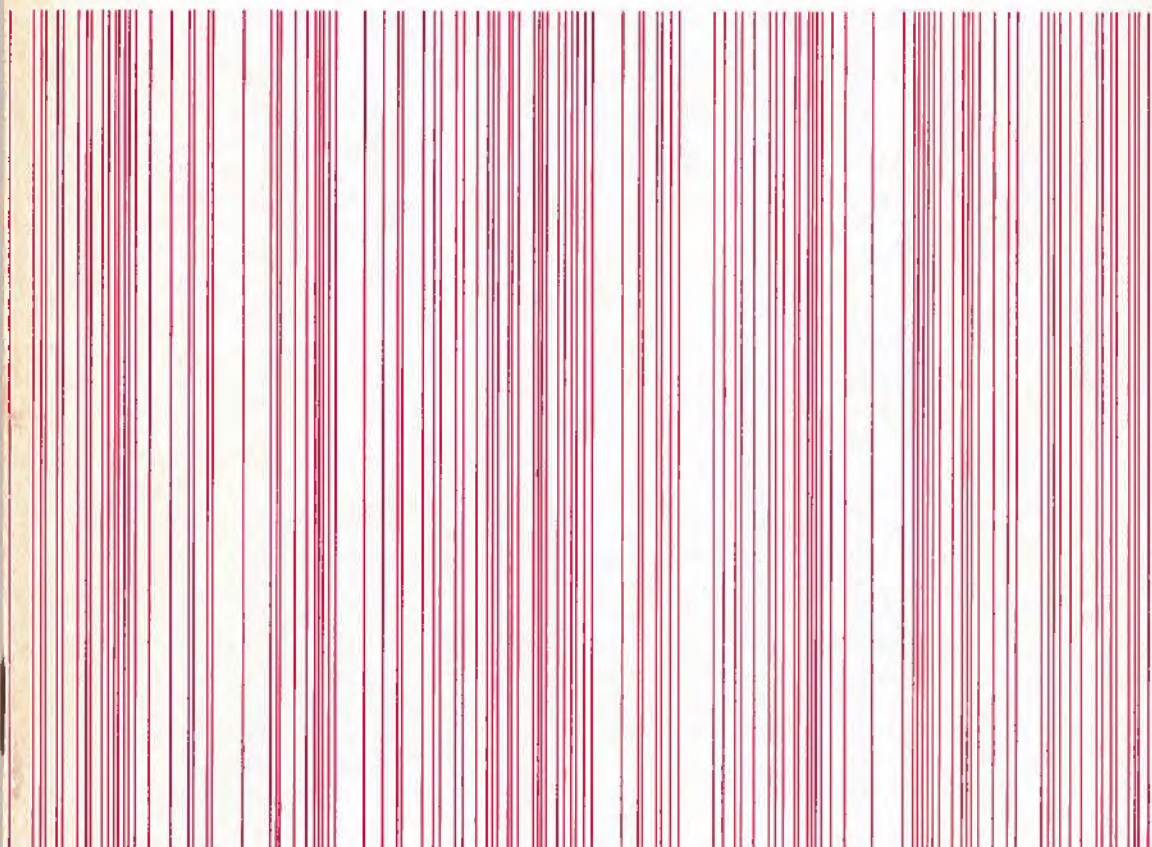

ALUMNI NEWSLETTER

SCHOOL OF CHEMICAL SCIENCES

UNIVERSITY OF ILLINOIS at Urbana-Champaign



NO. 8, WINTER 1973-74

The State of the Union

(Excerpts from the talk given by H. S. Gutowsky at the Illinois Luncheon at the Chicago ACS Meeting, August 28, 1973.)

The Early Calendar

The campus is experimenting with an early calendar this year, which starts early enough for the fall semester to be completed before Christmas. The spring semester then starts after a combined Christmas and between-semester vacation of nearly four weeks and ends in the middle of May. The main reason for this change is to avoid having the fall term broken up by the long Christmas vacation just before the last week or two of classes and final exams. There are some disadvantages. Hay fever sufferers will have to come back to the campus before the pollen count drops to a low level, and vacation habits will have to be modified. Also, the Urbana weather in late August and early September usually isn't pleasant for classes; however, an increasing fraction of our facilities is air conditioned so faculty and students will survive the change.

Feelings with respect to the new calendar are mixed. A substantial minority of the faculty oppose the change, so we're trying it out to see what advantages and disadvantages it offers. If it doesn't pan out, we'll go back to the old system. However, an increasing number of schools have gone to the early calendar during the past several years and have found it to be an improvement.

Problems Old and New

During each year, the problems and accomplishments are mainly a continuation of forces and activities which span periods of several years or more. However, since becoming head of the department in 1967, I've found that nearly every year another major problem has developed, with new and peculiar aspects. In the fall of '67, it was student turmoil: our first coercive demonstration to keep other students from meeting with recruiters from Dow. This was followed by the elimination of draft deferments for graduate students, by cuts in federal funding, by the over-supply of Ph.D.'s, and by continuing budget pressures and cuts in state support.

This past year or so, the main new problems have centered on faculty recruitment and promotion. The problems haven't been acute, but they've

been troublesome and have consumed much time and effort. In some cases, I feel that we've had to go beyond the point of diminishing returns. Moreover, the added efforts will very likely have to be continued for at least several years.

The campus administration has become increasingly concerned about the quality of the instruction on the campus, especially that for undergraduates. Also, as the campus enters a no-growth stage, there's the prospect of the whole faculty becoming tenured within a few years, with few if any openings for new blood.

All recommendations for promotion are now required to have documented evaluation of teaching performance, and promotions to tenure must be accompanied by five letters from high-quality persons at other institutions who evaluate the research or scholarly work of the person being recommended. Some of the details might be improved, but the intent, I feel, is certainly to the good. We customarily have sought outside opinion, but have required three letters rather than five. In some cases, we've obtained five or six, so not much additional effort is needed to meet the new requirements.

Documentation of teaching performance is more difficult. The usual way of doing this has been to have the students fill out a standardized course- and instructor-evaluation questionnaire at the end of a course. The results are tabulated, and the summary for a given course is compared to the results for other courses in the department and 'or college. For several years, our local ACS Student Affiliates Chapter has sponsored and handled the administration of such questionnaires and has selected each year about 10 to 15 percent of the professors and teaching assistants as outstanding teachers.

A questionnaire approach is not a very reliable way to evaluate instructional quality. It tells something about the students' subjective feelings at the time the course is finished, but that's only part of the matter. We need to develop more credible ways to evaluate instructional quality and to establish procedures for doing so on a continuing basis. The whole process must have as its main objective the improvement of our instruction. It's not a matter for which there's any simple solution. A small group of faculty and students are studying the matter; I hope we'll move ahead in dealing with it in the coming year.

Affirmative Action

In faculty recruitment, the main concern has been an affirmative action program to insure that appointments do not discriminate on the basis of sex, ethnic group, or national origin. Five years ago, we initiated programs through which we have actively solicited applications from qualified blacks for our various nonacademic positions and our graduate programs.

We presently have a hundred nonacademic employees in our school, of whom about ten are black and fifty-five are women.

At the graduate level, we've been successful in recruiting a number of blacks into chemistry, the number as of this fall being 10 or 11 out of a total of 300. This 3 percent figure compares favorably with the national

average of 2 percent. However, there are none in chemical engineering and only one in biochemistry, although there are appreciable numbers of orientals in those disciplines as well as in chemistry. Moreover, the campus developed what has proved to be a generally successful program of encouraging blacks to come as undergraduates.

The situation with respect to women is more complex. There aren't any women graduate students in our chemical engineering department, but there are 20 percent in biochemistry and nearly 15 percent in chemistry, these being pretty much the same as the national averages. However, the success of our women graduate students in completing the Ph.D. is significantly less than that of the men. Only about half of the women finish, while nearly 85 percent of the men complete their Ph.D.'s with us. I've checked into the causes for the difference and have assured myself that discrimination on the basis of sex is not responsible.

Across the country, women hold 8 percent of the Ph.D.'s in chemistry, but only 3 percent of the faculty positions in Ph.D.-granting departments. Most of the disparity doubtless comes from societal and biological factors which have assigned women the major role in child bearing and child rearing at the age that they would otherwise be most productive in research. However, some of the disparity no doubt comes from active discrimination against women based upon the fact that a smaller fraction of them than men have the motivation to be successful, as shown by their much higher drop-out or flunk-out rate as graduate students.

In any case, HEW became responsible a couple of years ago for insuring that universities and colleges receiving federal support above a rather low annual rate comply with an executive order barring discrimination on the basis of sex, race, religion, or ethnic group. Our campus was required, along with most others, to report the composition of sex, race, and ethnic group of our faculty and staff, with a breakdown by level of position and salary. This was reviewed and found wanting. The University was required to develop a program designed to redress its past faults and to prove that it was no longer beating its wife.

The initial affirmative action program was submitted to HEW by the University, again it was found wanting, and last fall a much more specific and rigid program was initiated.

In my judgment, much of what was required was reasonable or involved a nominal amount of effort and could be lived with. One major difference did evolve and required a lot of time. Initially, we were requested to advertise each of our openings in national publications such as *C and EN* or *Science*. I opposed this because I'd heard many tales that such ads led to several hundred responses, virtually all of which were from relatively weak candidates.

My arguments met with an often (to me) irrational response, but finally I gained approval for a procedure whereby we limited our recruiting to the top departments in the country but in which we got from each of them a list of their female and minority group postdocs and graduate students

who were finishing. We also asked for the area of specialization and an estimate of each person's qualifications. We then sent letters to those persons listed who appeared most suitable for the openings we had. The response to this approach was appreciable, but not overwhelming.

Also, subsequently, I encouraged Kurt Shuler at the University of California at San Diego and also J. G. Traynham at Louisiana State to make a detailed analysis of the several hundred responses each of them received to ads they'd run in *C and EN* and elsewhere. They found only 3 to 4 percent come from women, in contrast with the 10 percent or so of the current and recent Ph.D.'s who are women. These results have led to a reappraisal of our affirmative action guidelines and we will have an easier time in the coming year.

We have appointed a couple of women to meet temporary needs for the next year or two, and we do have an oriental as a visitor in our general chemistry program. We offered a regular appointment in biochemistry to a woman; however, at the last minute, she turned us down. She had four offers, so there's no lack of opportunities for outstanding women.

One step which the University has taken with some already visible benefits is to relax the nepotism rules to permit the hiring of relatives so long as they are not involved in the hiring, promotion, or benefits of one another. As a consequence, we have several wife and husband teams on the faculty, Jiri Jonas in chemistry, Ana in biochemistry; John Katzenellenbogen in chemistry, Bonita in physiology; I. C. Gunsalus in biochemistry and his wife in music; Olke Uhlenbeck in biochemistry and his wife in math; Elizabeth Rogers in general chemistry, half time, and her husband as dean of the College of Liberal Arts and Sciences.

Budget

The state budget for last year was on the tight side. However, we increased somewhat the average section size in our general chemistry program by allowing for drop-outs during the first two weeks of classes. Thereby we ended up with twenty-four to twenty-five students rather than starting with that number, and we were thus able to handle the 10 percent increase in our overall enrollments, much of which was in freshman chemistry. Total nonstate funding was up by, nearly 8 percent to over \$3.5 million, which was enough to cover inflation and compensate to some degree for the tight state budget.

The budgetary prospects for the new year are still uncertain. The General Assembly appropriation in late June was at a fairly reasonable level — certainly not generous but something we could live with. For example, it restored \$1.5 million for equipment, a provision deleted two years ago with increasingly serious consequences.

Unfortunately, Governor Walker exercised his line-item veto power and cut \$4 million from the personal-services budget of the University. Attempts to override this veto failed, so the University will operate this year on a very tight and restrictive budget.



H. S. Gutowsky, director of the School of Chemical Sciences and head of the Department of Chemistry.

Herbert S. Gutowsky
Director, School of Chemical Sciences
Head, Department of Chemistry

"Can the author of 200 scientific papers become one of the University's most successful administrators?" "Can the father of three swimmer-cyclists lead the formation of the nonathletic quality control apparatus for the Urbana campus?" "Can the husband of the principal for academics of the National Academy of Dance become the School of Chemical Science's premier bird watcher?" If the name of the author-administrator, father-leader, and husband-bird watcher is Herbert S. Gutowsky, the answer to all these burning questions is "Yes."

The research product of Professor H. S. Gutowsky is impressive in both quality and quantity. His contributions to physical chemistry are concentrated in two broad areas: the structure of molecules and solids, and intramolecular interactions and dynamics. These investigations have involved study of nuclear spin-spin interactions, proton hyperfine interactions, electron spin resonance, magnetic shielding, nuclear relaxation, infrared spec-

troscopy, and several other experimental approaches. It is characteristic of Gutowsky's mastery of his subject that each group of experimental reports is accompanied by one or more detailed and insightful theoretical treatments.

Evidence is everywhere of the tremendous contributions that Gutowsky has made to the advancement of chemistry. Every nuclear magnetic apparatus in every laboratory bespeaks this contribution, for it was he who first detected and recognized the value of the chemical shift and of spin-spin coupling, laying the basis for the most important spectroscopic tool in chemistry at the present time. As a university-based scientist, Gutowsky has accomplished much of this work with the assistance of talented research associates and of a large group of expertly trained graduate students. These young men and women have learned the importance of diligence, imagination, and enthusiasm in research, and many have already become outstanding scientists in their own right. Nearly every year some fundamental discovery in nuclear magnetic resonance spawns a host of applications, the parent and daughters often developing into a new, well-defined field of research (for instance, NMR chemical shifts, spin-spin coupling, spin-lattice relaxation, pulsed NMR). When studying papers dealing with these new developments, one is usually able to trace the work back to an original investigation reported by Gutowsky, his associates, and his students; and, one usually finds that he not only explored the phenomenon thoroughly and carefully, but that he suggested the basic applications and carried out demonstration studies of most of them.

This brief summary of the significance of Professor Gutowsky's research accomplishments contains ample explanation for his election to the National Academy of Sciences in 1960 and to the American Academy of Arts and Sciences in 1969. It also permits one to understand the award to him of a Guggenheim fellowship in 1954-55, the Walker Ames Visiting Professorship in Chemistry at the University of Washington in 1957, associate membership for 1962-63 in the University of Illinois Center for Advanced Study, an unrestricted research grant by the Petroleum Research Fund of the American Chemical Society in 1965, and the Irving Langmuir Award in Chemical Physics in 1966. To appreciate fully Professor Gutowsky's being tapped for the Midwest Award in 1973, one must look to other aspects of his distinguished career.

Herb Gutowsky was born on a farm near Bridgman, Michigan. His early collegiate education was also in the midwest, at Indiana University, whose A.B. he was awarded in 1940. Military service interrupted his graduate study at the University of California (Berkeley) sufficiently that his interests changed, so he took an M.S. degree at Berkeley in 1946 and proceeded thence to Harvard University, whose Ph.D. he was awarded in 1949.

Gutowsky came to Urbana as instructor in chemistry in 1948. Rising quickly through the ranks, he became professor of chemistry in 1956. From 1956 to 1962 he served the department as head of the Division of Physical Chemistry. In 1967 he succeeded H. E. Carter as head of the Department

of Chemistry and Chemical Engineering. During the next few years the reorganization of the department was completed and in 1970 Gutowsky became director of the School of Chemical Sciences, a position he holds in addition to his headship of the Department of Chemistry.

Gutowsky has been an active participant in affairs at local and national levels of both the American Chemical Society and the American Physical Society. At the present time, he is a member of the Committee on Professional Training and of the Committee on Nominations and Election of the ACS. He has been chairman of the Division of Physical Chemistry of the Chemical Society and is now chairman of the Division of Chemical Physics of the Physical Society.

Professor Gutowsky has served the Board of Directors of the Gordon Research Conferences almost continuously since 1958, most recently as chairman of the board. He has served the National Science Foundation as member and chairman of the Chemistry Panel, and is currently a member of its Advisory Committee on Planning and Institutional Relations. From 1961 to 1964 he was chairman of the Physical Chemistry Committee of the Division of Chemistry and Chemical Technology of the National Academy of Sciences-National Research Council, and is presently a member of the NAS Committee on Science and Public Policy.

In addition to writing scientific papers, Herb Gutowsky has also assisted in the formation of the policies governing their publication. He has been a member of the editorial boards of the *Journal of Chemical Physics*, *Chemical Reviews*, *Journal of the American Chemical Society*, *Journal of Molecular Spectroscopy*, *Chemical and Engineering News*, *ACS Monographs*, and *Science*. Since 1961 he has spent a little of his spare time as consulting editor for the *McGraw-Hill Encyclopedia of Science and Technology*.

H. S. Gutowsky is an even more active citizen of the University of Illinois than indicated in these paragraphs thus far. Active in the Faculty Senate from 1956 to 1970, he was among those elected to the reorganized Campus Senate in 1970 and, with three colleagues, continues to serve the Department of Chemistry in that capacity. It would be impossible to list all of the other bodies and committees toward whose work Herb Gutowsky has bent his talents, but alumni of the Urbana campus will be especially interested in some of his undertakings during the past few years.

He was a member of the University's 1970-72 Long-Range Planning Committee, which developed the latest in the series of academic plans for the Urbana-Champaign campus of the University of Illinois. Related to that work was the formation in September 1971, by the vice-chancellor for academic affairs, of a Study Committee On Program Evaluation (SCOPE). It was no surprise that the vice-chancellor selected Herb Gutowsky to chair that important committee. The significance of its work is indicated by the following extract of the letter of appointment:

The University appears to face an extended period in which innovation and change will be accomplished primarily through the rearrangement and reallocation of re-

sources, rather than through growth and the addition of resources, as in the past. We must establish guidelines for the evaluation of units and programs on this campus if we are to make wise decisions concerning the reallocations of resources. We are therefore requesting that (the) committee... recommend... guidelines for this process.

Additionally, SCOPE was charged with describing the bases on which evaluations were to be made, procedures to be followed, etc. Alumni in both corporate and academic life will have little difficulty in recognizing the import of such a charge.

Gutowsky's SCOPE report was published to the faculty in April of 1972 and resulted in joint action by the administration and the Campus Senate to establish a Council On Program Evaluation. Naturally, Herb Gutowsky is among the original members of the council. It is obvious that as long as he is a member there will be strong pressures to use the council as a device for encouraging the improvement of the quality of scholarship broadly throughout the campus. The quality of the SCOPE report did not escape notice elsewhere. Though he had not previously exhibited any particular charm at activities within the University of Illinois, the then chairman of the Illinois Board of Higher Education nevertheless felt impelled to suggest that other universities in the state's several systems of higher education might well use the recommendations of the SCOPE report to guide the formation of their own evaluation and quality control machinery. As a member of one of the citizens' commissions of the Board of Education in Champaign, Herb is also working toward similar objectives on behalf of the local public schools.

The fact that distinguished faculty of the University have personal lives is often neglected in descriptions such as these of their professional and scholarly attainments; that neglect will be repaired here. Danny, Chris, and Robb Gutowsky *are* accomplished swimmer-cyclists; whether Danny will find time to engage in either sport during his freshman year at Princeton is a question as yet unanswered. Barbara Gutowsky *is* the newly inaugurated principal for academics of the National Academy of Dance in Champaign. And, the author of this report to Illinois biochemistry, chemical engineering, and chemistry alumni wants to make it perfectly clear that he has been informed by an unusually reliable source that Director Herbert Gutowsky is the premier bird watcher of the School of Chemical Sciences.

P. E. YANKWICH

P.S. H. S. G. asserts that the last is true only because the competition isn't what it used to be!

Biochemistry at Illinois

The program in biochemistry at Illinois has experienced several important changes in recent years. These range from a departmental reorganization to the development of new teaching programs and recruitment of new research personnel for the development of strong programs in nucleic acid and membrane research. About four years ago, in connection with reorganization of the Department of Chemistry and Chemical Engineering into the School of Chemical Sciences, biochemistry achieved departmental status and offered an undergraduate biochemistry major along with its masters and doctoral degree programs. The undergraduate program has grown at a much faster rate than originally anticipated. Today there are some 140 undergraduate majors and 70 graduate students in biochemistry. New trends in research interests are evident in the faculty members who have joined the Department of Biochemistry. The development of a new School of Basic Medical Sciences on the Urbana-Champaign campus has offered an opportunity for moderate expansion in the biochemistry staff.

Dr. Richard Gumpert, a graduate of the University of Chicago, joined the Department of Biochemistry at Illinois in 1972 as the first biochemical appointee in the new medical school. This fall, Dr. George Ordal, a graduate of Stanford University, joined the department as a joint appointee in biochemistry and the School of Basic Medical Sciences. Dr. Gumpert's major research interests are centered in the nucleic acid field, especially the mechanism of initiation and replication of DNA in *Escherichia coli*. Dr. Ordal is primarily interested in chemotaxis, phototaxis, and related tatic phenomena. Dr. Ordal did postdoctoral research with Dr. Julius Adler at the University of Wisconsin before coming to Illinois.

Dr. Daniel Storm joined the biochemistry staff this fall and is organizing a research program in membrane biochemistry, with special emphasis on the characterization of adenyl cyclase, an important membrane enzyme involved in the synthesis of cyclic AMP and representing an important component in regulation of metabolism. Dr. Storm took his Ph.D. degree at Berkeley with Professor Dan Koshland and, before coming to Illinois, spent two years in postdoctoral work in Professor Stominger's laboratory at Harvard.

Dr. Olke Uhlenbeck joined the biochemistry faculty in 1970. Dr. Uhlenbeck took his Ph.D. degree at Harvard University with Dr. Paul Doty and served a two-year postdoctoral period at Berkeley as a Miller fellow, working with Professor Tinoco. Dr. Uhlenbeck's interests are centered in the nucleic acid field, especially in structure-function relationships in t-RNA. Dr. Uhlenbeck has exploited the use of synthetic oligomers as probes to define structure in both RNA and DNA molecules.

Dr. William McClure took his Ph.D. degree at the University of Washington with Dr. Hans Neurath and then spent two years as a postdoctoral

fellow in Professor Jerry Eidelman's laboratory at Rockefeller University. Although trained as a protein chemist, Dr. McClure organized a research effort in the neurochemistry-neurobiology area upon his arrival at Illinois. He has developed axoplasmic transport as his major research interest and has provided effective communication between biochemistry and the neurobiology groups at Illinois.

Dr. Robert Switzer joined the biochemistry staff in 1968. Dr. Switzer took his Ph.D. at Berkeley and, before coming to Illinois, did postdoctoral work with Dr. Earl Stadtman at the National Institutes of Health. His principal research interest is in the area of regulation of metabolism. He has focused his attention on an enzyme called phosphat ribosylpyrophosphate synthetase (PRPP synthetase), an early enzyme involved in the biosynthesis of purine and pyrimidine nucleotides and in amino acid biosynthesis. He has also developed a program for the study of the regulation of enzyme levels during sporulation in bacteria.

Dr. Karl Dus joined the biochemistry staff in 1969. Dr. Dus received his Ph.D. training in Vienna, Austria, and did postdoctoral work with Professor Martin Kamen at the University of California, La Jolla. Dr. Dus is a protein chemist, especially skilled in amino acid sequencing, and has concentrated his efforts in the heme protein field, especially with respect to structure-function relationships and has used heme protein sequences as a measure of evolutionary development and relatedness.

Dr. John Clark maintains an active program in studies directed toward the mechanism of protein synthesis. Several years ago, Dr. Clark and Dr. Reichman from the School of Life Sciences established an *in vitro* protein synthesizing system using a special viral RNA as messenger for the synthesis of virus coat protein. Dr. Clark has used this system to study several aspects of protein biosynthesis, especially the signals used for initiation of new polypeptide chains in both eucaryotic and prokaryotic systems.

Professor John Wood is best known for his contributions to the problems of mercury pollution and associated environmental factors through his studies on the transfer of methyl groups from methyl vitamin B₁₂ to metals. These studies sparked a revolution in the interpretation of environmental problems since they provided a firm basis for understanding how highly toxic methyl derivatives of mercury could be generated through natural enzymatic processes.

Professor I. C. Gunsalus continues his very elegant studies on the mechanism of enzymatic hydroxylation reactions. He and his students have isolated and crystallized a soluble P-450 cytochrome which participates in oxygen activation reactions leading to hydroxylation. Their cytochrome P-450, which comes from a bacterial source, is extremely useful because all animal cell P-450 cytochromes are membrane bound and cannot be readily extracted in soluble form. Thus the bacterial cytochrome P-450 from Gunsalus' laboratory offers the best enzyme source for studying the mechanism of enzymatic hydroxylation and related phenomenon in this important area of metabolism.

Professor Gregorio Weber was recently honored at a University of Illinois Scholar Award dinner. Professor Weber was cited for his pioneering work in developing fluorescent probes and the application of these probes to the study of macromolecules in solution. More recently, Professor Weber has become very active in the field of ligand binding to proteins and cooperative behavior in enzymatic catalysis.

In addition to serving as head of the Department of Biochemistry, Professor Lowell Hager continues his work on the mechanism of enzymatic halogenation in peroxidase systems. He and his group, in collaboration with Professor J. C. Martin in the Department of Chemistry, have described the chemical composition of peroxidase Compound I, the oxidized enzyme intermediate which is formed as an initial intermediate in all peroxidase reactions. Professor Hager recently returned from a six-month visit to Renato Delbecco's laboratory at the Imperial Cancer Research Institute in London where he learned tissue culture techniques and animal tumor virus biology.

Three biophysical chemists in the School of Chemical Sciences hold joint appointments in physical chemistry and biochemistry and teach courses in the physical chemistry area. Dr. James G. Wetmur came to the University of Illinois in 1969 upon the completion of his military obligations. He was trained at California Institute of Technology in Professor Norman Davidson's laboratory. Dr. Wetmur's research interests are in the nucleic acid field; he is best known for his studies on the kinetics of renaturation of the double-stranded structure of DNA.

Dr. Paul Schmidt did his Ph.D. work at Stanford University in Professor Baldeschwieler's laboratory, where he worked on the application of n.m.r. techniques to macromolecules. He has continued this work at Illinois and has especially concentrated on studies of aspartate transcarbamylase, a multi-subunit enzyme which is composed both of catalytic and regulatory subunits.

Dr. Robert Gennis joined the biophysical group this fall. He came to Illinois by way of a Ph.D. at Columbia University and a postdoctoral fellowship with Professor Strominger at Harvard. Professor Gennis's principal research interest is in the membrane field, particularly the interaction of proteins and lipids in a membrane environment.

Our New Staff Members

During the past year, four persons have joined the faculty of the School of Chemical Sciences, all as assistant professors.

Larry R. Faulkner — Chemistry. B.S., Southern Methodist University, 1966; Ph.D., University of Texas at Austin, 1969. Dr. Faulkner's interests lie particularly in electrochemistry, chemiluminescence from electron transfer processes, and phenomena and applications involving molecular fluores-

cence and phosphorescence. He joined us in January, coming here from a position as an assistant professor of chemistry at Harvard University.

Robert B. Gennis — Chemistry. B.S., University of Chicago, 1966; Ph.D., Columbia University, 1971. Dr. Gennis served as a research fellow at Harvard from 1971 to 1973. His research interests involve the structure and function of biological membranes.

George W. Ordal — Biochemistry and the School of Basic Medical Sciences. A.B., Harvard University, 1965; Ph.D., Stanford University, 1971. Professor Ordal's interests concern the molecular mechanism of chemotaxis in *Escherichia coli*, mainly involving isolation and characterization of mutants. He came here after serving as a postdoctoral fellow at the University of Wisconsin.

Daniel R. Storm — Biochemistry and the School of Basic Medical Sciences. B.S., University of Washington, 1966; M.S., University of Washington, 1967; Ph.D., University of California, Berkeley, 1971. From 1971 to 1973, Dr. Storm was a research fellow at Harvard University. His research interests involve the mechanisms of peptide antibiotic activity and of enzyme catalysis.



New staff members Robert Gennis, Larry Faulkner, George Ordal, Daniel Storm.

Honors and Awards to Faculty Members

Professor **H. S. Gutowsky**, director of the School of Chemical Sciences and head of the Department of Chemistry, has received the Midwest Award for 1973. This award is granted annually in recognition of outstanding contributions to the advancement of chemistry by a resident of the midwest. Dr. Gutowsky was the pioneer in the development and chemical use of nuclear magnetic resonance spectroscopy.

Professor **H. G. Drickamer** is the 1974 winner of the ACS Irving Langmuir Award in Chemical Physics. He is to be honored for his research on the behavior of solids at pressures up to nine million pounds per square inch which has turned up new and entirely unexpected phenomena. Professor Drickamer's work is quite interdisciplinary and he has research students in chemistry, chemical engineering, and physics. Professor Drickamer has also received the W. H. Walker Award of the American Institute of Chemical Engineers. This award was established "to encourage excellence in contributions to the chemical engineering literature."



H. G. Drickamer



W. H. Flygare

Professor **R. S. Drago** has been awarded a John Simon Guggenheim fellowship and will spend the second semester visiting departments of chemistry in California, England, and Italy.

Professor **Willis Flygare** is to be the recipient of the 1973 Leo Hendrik Baekeland Award of the ACS New Jersey Section, which is sponsored by Union Carbide and awarded biennially. It recognizes accomplishments in chemistry by persons under forty years of age.

The American Institute of Chemical Engineers has granted the Allan P. Colburn Award to Professor **Charles A. Eckert**. This award goes to an individual under thirty-five years of age whose work has had great influence on the theory, practice, and teaching of chemical engineering.

Professor **J. D. McDonald** has been awarded an Alfred P. Sloan Research Fellowship.

Professor **R. A. Marcus** has been elected a fellow of the American Academy of Arts and Sciences.

Professor **Gregorio Weber** has been chosen to be a corresponding member of the Argentine Academy of Exact Sciences.

Professor **I. C. Gunsalus** has been elected president-elect of the American Society of Biological Chemists.

This fall, the Urbana-Champaign community held a dinner in honor of twenty-seven members of the faculty who are distinguished scholars. Of the twenty-seven so honored, three are members of the School of Chemical Sciences — Professor **H. G. Drickamer** from the Department of Chemical Engineering, Professor **Gregorio Weber** from Biochemistry, and Professor **Nelson Leonard** from Chemistry. The dinner speakers were Governor Daniel Walker and Dr. H. G. Stever, director of the National Science Foundation. The trustees of the University also attended.

Awards to Our Alumni

This year four alumni and two former staff members have won awards administered by the American Chemical Society.

The list should properly start with **C. C. Price III** (staff, 1937-46), who is now a member of the faculty at the University of Pennsylvania and who has won *two* ACS awards this year. He has been chosen for the Award for Creative Invention for his studies on the polymerization of propylene oxide to polyurethane rubber. This discovery is the basis of a multimillion dollar industry. Dr. Price has also been selected for the Charles Lathrop Parsons Award for his outstanding public service. He has been active in the World Federalists, the Council for a Livable Work, and in United States politics. Also, he has served on numerous panels for the NSF, NIH, and the National Bureau of Standards. During World War II, he played a leading role in national defense activities.



C. C. Price



William J. Bailey



James D. Winefordner

Professor **William J. Bailey** (Ph.D., 1946) has been elected to the position of president-elect of the American Chemical Society for 1974. He will advance to the presidency on January 1, 1975. Professor Bailey, whose research interests lie in the polymer field, is on the staff of the University of Maryland.

James D. Winefordner (B.S., 1954; M.S., 1955; Ph.D., 1958), now professor of chemistry at the University of Florida, has also won two awards this year—the ACS Award in Analytical Chemistry, sponsored by the Fisher Scientific Company, and the Award in Applied Spectroscopy, granted by the Society of Applied Spectroscopy. The Fisher Award came to Dr. Winefordner for his work in atomic fluorescence spectroscopy, and the Applied Spectroscopy Award, specifically for his research on the development of fluorescence and phosphorescence spectroscopy and on his theoretical and experimental work on signal to noise ratio in spectroscopy.



C. G. Enke



E. C. Taylor



Robert C. Brasted

C. G. Enke (Ph.D., 1959) of Michigan State University has been selected to receive the ACS Award in Chemical Instrumentation sponsored by the Sargent-Welch Scientific Company. The award was based on Professor Enke's contributions to electronics education and computer and microcomputer interfacing.

Professor **E. C. Taylor** (staff, 1951-54), now A. Barton Hepburn Professor at Princeton University, has been chosen as the 1974 winner of the ACS Award in Synthetic Organic Chemistry, sponsored by the Synthetic Organic Chemical Manufacturers Association. Professor Taylor is widely known for his use of thallium in organic syntheses and his work with pteridines.

Robert C. Brasted (Ph.D., 1942), now professor of inorganic chemistry and director of the general chemistry program at the University of Minnesota, has received the 1973 ACS Award in Chemical Education, sponsored by the Scientific Apparatus Makers Association.

Albert L. Elder (A.B., 1923; M.S., 1925; Ph.D., 1928) has been chosen to receive the first ACS Award of the Agricultural and Food Chemistry

Division, sponsored by International Flavors and Fragrances. Dr. Elder was coordinator of the penicillin program from 1941 to 1944, and director of research and director of the Institute of Nutrition CPC International from 1944 until his retirement in 1966. He was president of the American Chemical Society in 1960. Since retirement, he has been on the Board of Directors of the Volunteers in Technical Assistance and League for International Food Education.



Albert L. Elder



Theodore Cairns

Horace A. DeWald (Ph.D., 1950) has received the 1973 Award for Excellence in Industrial Chemical Research which is sponsored by the University of Michigan Section of the A.C.S. The award consists of an A.C.S. major plaque and an honorarium. The recipient is also invited to present an award lecture before the section. DeWald, who is employed at Parke, Davis and Company, is the second recipient of this award.

The International Union of Pure and Applied Chemistry will sponsor a Symposium on Macromolecules in Rio de Janeiro, July 26-31, 1974, which will especially honor Professor C. S. Marvel (Ph.D., 1920; staff, 1920-1961). Dr. Marvel is now professor of chemistry at the University of Arizona, where he is directing the research of a group of postdoctoral students.

Theodore Cairns (Ph.D., 1939), director of the Central Research Department at the Du Pont Company, was the recipient of the 1973 Perkin Medal. He was cited especially for his discovery of the cyanocarbons, which opened a new area of chemistry.

The Department of Chemistry of Vanderbilt University has established the Arthur William Ingersoll Memorial Lectureship in honor of A. W. Ingersoll (Ph.D., 1922), who was, for forty-one years, a member of that department and a well-known authority on the resolution of potentially optically active substances. The first lecture honoring Professor Ingersoll was given by Daryle H. Busch (Ph.D., 1952), professor of inorganic chemistry at Ohio State University.

A. John Speziala (Ph.D., 1948), Monsanto Chemical Company, has been selected for the 1973 St. Louis Award. This award is given each year to

a member of the St. Louis Section who has made outstanding contributions to the chemical profession.

Lealyn B. Clapp (Ph.D., 1941), now professor of chemistry at Brown University, was one of three college chemistry teachers selected by the Manufacturing Chemists Association to receive an Award for Excellence in Teaching this year.

Julius E. Johnson, Jr. (Ph.D., 1943) of the Dow Chemical Company has been chosen by his undergraduate alma mater, the University of Colorado, to receive the Norlin Award in recognition of his outstanding achievements in biochemistry.

R. W. Parry (Ph.D., 1946), distinguished professor of chemistry at the University of Utah, has been elected to the Board of Directors of the American Chemical Society.

Dr. Reid T. Milner (B.S., 1924; M.S., 1925), recently retired head of the Department of Food Science at the University of Illinois, has been elected president of the Institute of Food Technologists.

At a special ceremony last winter, **Sidney D. Kirkpatrick** (B.S., 1916), long-time top-level employee of the McGraw-Hill Company, was given the John R. Kuebler Award of Alpha Chi Sigma Fraternity for his great contributions to the profession and to the fraternity. We must add, sadly, that Mr. Kirkpatrick died soon after receiving this award.

Ralph L. Shriner (Ph.D., 1925; staff, 1927-41), visiting professor at Southern Methodist University, has received the 1973 Wilfred T. Doherty Award, sponsored by the ACS Dallas-Fort Worth Section. He was cited as "one of the great teachers of organic chemistry, whose career has spanned fifty-two years."

Joel Selbin (Ph.D., 1957), Louisiana State University, has been given the Charles E. Coates Memorial Award for his contributions to the profession and the community. The award is sponsored jointly by the Baton Rouge sections of ACS and A.I.Ch.E.

Harry H. Sisler (Ph.D., 1939), executive vice-president of the University of Florida, has been awarded the Order of the North Star by the King of Sweden. He was chosen for this honor in recognition of his contribution to scientific cooperation and exchange between Swedish and American scientists, particularly through his role in the Quantum Theory Exchange Project between the University of Florida and the University of Uppsala.

Case-Western Reserve University has established a professorship in honor of **Frank Hovorka** (M.S., 1923; Ph.D., 1925), a member of the faculty there from 1925 until 1968, and professor emeritus since 1968. The endowment for the Hovorka Chair in Chemistry was started by a gift of \$250,000, by Mrs. Lester Sears, and increased by another gift of \$250,000 from Dr. and Mrs. Hovorka themselves. It is hoped that at least another quarter of a million dollars can be raised, so the endowment will fully support the professorship. Professor Hovorka was head of his department for ten years, and is noted as an outstanding teacher.

Honorary Degrees

At the University's June 1973 commencement, Dr. Karl Folkers (B.S., 1928), founder and now a member of the Institute of Biomedical Research at the University of Texas at Austin, was awarded the honorary degree of Doctor of Science. Folkers has devoted his career to the isolation, structure, and synthesis of compounds of biological significance, including vitamin B₁₂, coenzyme Q, antibiotics, and hormones. He was president of the American Chemical Society in 1962.

R. Byron Bird (B.S., 1947), Vilas Research Professor of Chemical Engineering at the University of Wisconsin, received the honorary degree Doctor of Engineering from Washington University in May.

John C. Bailar, Jr., was awarded the honorary degree of Doctor of Science by Lehigh University at the spring graduation exercises.

Lecture Series in the School of Chemical Sciences

Third Annual Doisy Lectures

The annual Ada A. Doisy Lectures in Biochemistry were endowed by Professor E. A. Doisy in honor of his mother. The lectures in this, the third year of the series, were given by Professor Saul Roseman and Professor Bruce N. Ames, on November 8 and 9, respectively.

Saul Roseman, professor of biology and director of the McCullum-Pratt Institute at Johns Hopkins University, has recently discovered a new enzyme system which promotes the transport of sugars across bacterial membranes. Dr. Roseman and his group have shown that sugars are transported through a series of enzyme-mediated steps which involve the phosphorylation of membrane proteins and the transfer of phosphate groups from the membrane proteins to the sugar molecules. These studies, together with his work on the chemistry of complex carbohydrate structures found on cell surfaces and his work on cell surface differences between normal and cancer cells, place him at the forefront of progress in the chemistry and biology of cell membranes.

Bruce N. Ames, professor of biochemistry at the University of California at Berkeley, is best known for his brilliant studies of the genetic organization and regulation of biosynthetic sequences in bacteria. His work on the structure and regulation of the histidine operon in *Salmonella* greatly extended our understanding of the functioning of groups of genes that are regulated as a unit by specialized regulatory genes. He and his coworkers

demonstrated that the histidine operon was actually regulated by molecules involved in histidine metabolism: histidyl transfer RNA and at least one enzyme of histidine biosynthesis. These findings have had a major influence on our current ideas concerning the regulation of metabolic systems. Always a master at the use of genetic techniques to solve biochemical problems, Aines has recently turned his attention to the use of microbial mutants for sensitive and selective screening of potential mutagens and carcinogens—substances which occur even more frequently in man's increasingly chemically complex environment.

Sherwin-Williams Seminars

This year, there were two series of seminars under the sponsorship of the Sherwin-Williams Company, one in organic synthesis and one in biophysical chemistry. The speakers for the seminars in the organic series and the subjects of their talks were as follows: Professor Pierre Deslongchamps, University of Sherbrooke, Quebec, Canada, who spoke on "Synthetic Studies toward Ryanodine" and "The Importance of Conformation of the Tetrahedral Intermediates in the Hydrolysis of Esters and Amines"; Professor Samuel J. Danishefsky of the University of Pittsburgh whose titles were "Approaches to the Synthesis of Vernolepin" and "Simplified Approaches to Steroid Synthesis"; and Professor William F. Johnson of Stanford University, who gave two lectures under the general title, "Nonenzymic Biogenetic-like Olefinic Cyclizations."

The Sherwin-Williams seminars in biophysical chemistry were given by Professor Harden McConnell of Stanford University, who spoke on "Molecular Motions in Membranes," and by Professor Alex Rich of the Massachusetts Institute of Technology, who gave two lectures entitled "Three-Dimensional Structure of Transfer RNA" and "The Mechanism of Protein Synthesis." Professor Bruno Zimm of the University of California at San Diego will present a seminar in the spring on the topic "Relaxation Viscometry of Large DNA Molecules."

William Albert Noyes Lecture

The William Albert Noyes Lecture, sponsored annually by the Illinois Chapter of Phi Lambda Upsilon, will be given on the evening of March 6. Dr. Philip Handler, president of the National Academy of Sciences, will be the speaker.

John C. Bailar, Jr., Lecture

The John C. Bailar, Jr., Lectures were given on Monday and Tuesday, December 3 and 4, by Professor Richard Holm of the Massachusetts Institute of Technology. His lectures were on the topic "Analog Approach to the Elucidation of the Mode of Action of Iron Sulfur Proteins. I. Eight and Four Iron Cases, II. Two Iron Cases."

Louis G. Krug Lecture Series

The Louis G. Krug Lecture Series will be initiated this year by the local chapter of Alpha Chi Sigma, under an endowment of \$10,000 left by Mr. Krug (B.S., 1917). Mr. Krug also left an endowment to the University Band, of which he was a member in his student days. In addition, he was captain of the University water polo team and a member of the swimming team. After graduation, he served for a year in the Medical Corps of the U.S. Army, and then was for a few years a chemist with the Illinois Steel Company and the William Wrigley Company. He then joined the Chicago Rawhide Company, which he served as a sales engineer and executive for forty years. Upon his retirement in 1962, he and his wife moved to La Jolla, California, where he became an active member of the San Diego Illini Club. He died in June 1972 at the age of seventy-nine.

The name of the 1974 lecturer in the Krug series has not yet been announced.

Undergraduate Honors and Awards

Freshman Scholarships of \$500 each were awarded to nine very promising students for the 1973-74 school year. These scholarships are awarded strictly on the basis of academic achievement in high school, without regard to financial need. The recipients, therefore, represent the best in scholarship in the state of Illinois. We are most grateful to our alumni and the Monsanto Company who have made these grants possible. The recipients and the sources of the award grant are:

James H. Christensen, Lake Villa — Monsanto Company
Stephen P. Donahue, Wilmette — Monsanto Company
Daniel C. Duan, Quincy — Roger Adams Fund
Clayton P. Henderson, Anna — Roger Adams Fund
Charles Meyerson, Orland Park — Roger Adams Fund
Janis E. Pearce, Mt. Prospect — Roger Adams Fund
Mark S. Podrez, Niles — Monsanto Company
William M. Quick, North Chicago — Monsanto Company
Kerry M. Riley, Champaign — Roger Adams Fund

Agnes Sloan Larson Awards of \$200 each were given last fall to the five sophomores in the School of Chemical Sciences who achieved the highest grade-point averages in their freshman year. These awards are made possible by an annual grant by Dr. Arthur W. Sloan (B.S. 1922) in honor of his sister, Mrs. Agnes Sloan Larson (B.S. 1919), who was a chemistry major and valedictorian of her class. The students who won these awards are:

Thomas D. Ingolia, Morton
Douglas A. Lauffenberger, Des Plaines

Craig E. Meyer, Brookfield
Patricia A. Michael, Springfield
James L. Taylor, Flossmoor

The **Elliott Ritchie Alexander Award**, sponsored by Phi Lambda Upsilon, honorary chemical fraternity, is given to the student in biochemistry, chemistry, or chemical engineering who in his first two years at the University has attained the highest scholastic average. The award is a book of the student's choice. The student's name is also inscribed on a plaque which is displayed in the Chemistry Library.

This year, five students had identical averages, so Phi Lambda Upsilon gave each a book. The students so honored were Ira M. Asher of Chicago Heights, Michael E. Hovey of Indianapolis, Dominic M. Meldi of Wilsonville, Robert J. Sauls of Wheaton, and Grace Toy of Chicago.

The **Illinois Institute of Chemists Awards** go each year to the graduating seniors in chemistry, chemical engineering, and biochemistry who are most outstanding in scholarship, personal integrity, and leadership. The award is a certificate presented by the Illinois Institute of Chemists. This year the winners were:

Clifford Dykstra, Oaklawn
William D. Meinhart, Montrose
Deborah L. Hicks, Godfrey

The **American Institute of Chemical Engineering Award**, which consists of a certificate, a two-year subscription to the *A.I.Ch.E. Journal*, and a pin, goes to the junior in chemical engineering who has attained the highest grade-point average during his first two years. The winner this year is James Taylor of Flossmoor.

The **Alpha Chi Sigma Plaque** is given each year by the Zeta Chapter of Alpha Chi Sigma to recognize the sophomore or junior student in biochemistry, chemistry, or chemical engineering who has attained the most outstanding academic performance in his University studies. The name of this student is engraved on a plaque which hangs in the Chemistry Library. The name which was added this year is that of Terence Michael Lenhardt of Dolton.

The **Algernon Dewaters Gorman Prize** is awarded at the June commencement every third year to the student in biochemistry, chemistry, or chemical engineering with junior standing who has the highest grade-point average, provided he has earned not less than twenty-five hours credit in biochemistry, chemistry, or chemical engineering. The average is based on all courses taken on this campus exclusive of physical education and military. This year the award went to Paul Robert Kucera of Niles.

The **Reynold Clayton Fuson Award** went this year to P. L. Wyffels of Geneseo. This prize is given to the student who, through the first semester of the senior year, has made the most outstanding academic improvement.

The **Worth Huff Rodebush Award** is a monetary award which is given to the most able senior who has demonstrated his intention to make a career in chemistry, biochemistry, or chemical engineering. The winner this year is James Taylor of Flossmoor.

The **Merck Award** consists of a copy of the *Merck Index*. Three such awards are made each year — one each to three outstanding seniors in the chemistry, chemical engineering, and biochemistry curricula. The 1973 awards went to Alan Goodman of Highland Park (biochemistry), Peter Wolf of Elgin (chemical engineering), and Kevin A. Klotter of Des Plaines (chemistry).

The **Phi Lambda Upsilon Cup** stands in a case in the hall of Chemistry Annex. Each year, the name of the sophomore who has the highest scholastic average among the students in the curricula of biochemistry, chemistry, and chemical engineering is engraved on the cup. This year six students had identical averages, so the following names were inscribed on the cup: Thomas D. Ingolia of Morton, Raymond V. Janevicius of Kankakee, Douglas A. Lauffenburger of Des Plaines, Craig E. Meyer of Brookfield, Patricia A. Michael of Springfield, and Donald J. Steiner of Northbrook.

The **Kendall Award** went to Todd Brethauer of Downers Grove. This is a monetary award given each year to a student in biochemistry, chemistry, or chemical engineering who is a member of Phi Lambda Upsilon and shows the greatest promise in his or her chosen field.

New Graduate Student Awards in Analytical Chemistry

The Division of Analytical Chemistry of the American Chemical Society administers several graduate fellowships which are sponsored in part by chemical companies and in part by the division itself. The fellows are chosen in nationwide competition. Students at Illinois won two of the three full-year fellowships granted this year.

James D. Defreese, who is studying with Professor Malmstadt, won the Procter and Gamble fellowship, and Thomas M. Thorpe, who is working under the direction of Professor Natusch, won the Perkin-Elmer fellowship. Each of these students will receive a \$4,000 stipend for the year.

Mrs. Barbara J. Slatt, who is also a student with Professor Natusch, won one of the five summer fellowships. These are sponsored by the Analytical Division of the ACS and carry a stipend of \$800 for the summer term.

Undergraduate and Graduate Enrollments

Enrollments at the Urbana-Champaign campus of the University are up from 1972, and this is reflected in the undergraduate curricula of the School of Chemical Sciences. In addition, there is a slight increase in graduate enrollment this fall. The exact figures are given in the accompanying table.

<i>Enrollments</i>	<i>1972-73</i>	<i>1973-74</i>
Total Enrollment at Urbana-Champaign	33,857	34,651
General Chemistry Courses	3,089	3,338
Undergraduate Majors in SCS		
Chemistry Curriculum	151	170
Sciences and Letters Majors in Chemistry	273	222
Chemical Engineering	160	159
Biochemistry	100	144
<i>Total in Undergraduate Curricula</i>	<u>684</u>	<u>695</u>
Graduate Majors in SCS		
Chemistry	294	299
Chemical Engineering	52	52
Biochemistry	69	70
<i>Total in Graduate Work</i>	<u>415</u>	<u>421</u>

Although the total number of graduate students increased only slightly, there were some rather large changes in the distribution of students among the various areas in the Department of Chemistry. The largest increase was seen in analytical chemistry where the number of majors increased by fifteen to fifty-one, offsetting small declines in the areas of organic and physical chemistry. The increased interest in analytical work on the part of incoming students seems to be often related to interests in environmentally related applications of chemistry.

Employment of Graduates

The employment picture for chemists and chemical engineers is much brighter this year than it has been for several years, and it is with great satisfaction that we report that all of those completing advanced degrees in our various curricula during the 1972-73 year have been placed. While the atmosphere for industrial employment is quite favorable, it is obvious that opportunities in academic work will remain scarce for many years.

Visits from 118 industrial firms were scheduled for the fall 1973 recruiting period, up about 75 percent from the number of visits completed during the same period last year. At the same time, it is apparent that the recruiters are being very selective, and that industries are looking for people whose backgrounds very nearly match the specific vacancies they desire to fill.

Of the interviewing companies this fall, the interest in our degree candidates has been broken down into percentages, as follows:

30%	B.S. chemical engineers
20%	M.S. chemical engineers
14%	B.S. chemists and biochemists
10%	M.S. chemists and biochemists
14%	Ph.D. chemists and biochemists
12%	Ph.D. chemical engineers

There have been very few calls for biochemists at the B.S. level. Most of these people hope to go to medical school or into graduate work.

Summer employment opportunities in industry continue to be very scarce, with only six of the visiting companies this fall indicating that they would interview summer candidates at the same time that they interviewed permanent employment candidates.

About seventy recruiting visits are now scheduled for February and March 1974, and the Placement Office reports that they are receiving several telephone calls each week requesting recruiting dates.

The services of the Placement Office are available, not only to graduating students, but to alumni who need help in relocating.

School of Chemical Sciences Funds

The alumni and friends of the School of Chemical Sciences have shown their loyalty in many ways. In recent years, this has been shown in part by your generous contributions to the Roger Adams Fund, the Illini Chemists Fund, and the John C. Bailar Lectureship Fund. Income from the Roger Adams Fund can be used for any purposes where there are special needs, but thus far it has been used to support undergraduate scholarships in chemistry, chemical engineering, and biochemistry. The body of this fund now stands at a little more than \$74,000. The Illini Chemists Fund is used to support this *Alumni Newsletter*. It now stands at about \$1,700. The annual John C. Bailar lectureship is supported by funds contributed by colleagues, friends, and former students of Professor Bailar. The fund was established on the occasion of Professor Bailar's sixty-fifth birthday in 1969 and now totals about \$10,000.

We urge all alumni to support these funds, and we have enclosed a form

which can be used for this purpose. We shall be equally happy to have your contribution without the form. In that case, however, it will be necessary for you to indicate that your gift is intended for one of these funds. Checks should be made payable to the University of Illinois Foundation, and sent to the foundation or to the School of Chemical Sciences.

New Ph.D.'s from the School of Chemical Sciences

Ph.D. Recipients in February 1973

Barron, James Alden Organic Peter Beak
Carothers Laboratory, E. I. du Pont de Nemours & Company, Experimental
Station, Wilmington, Delaware
"Product and Mechanistic Studies in the Reactions of Chloroformates with
Silver Salts: The Vinyl and Four-Tertiary-Butylcyclohexyl Systems"

Bransman, Alan Richard Organic K. L. Rinehart
Chemistry Department, University of Virginia, Charlottesville, Virginia
"Structural and Synthetic Studies of the Antibiotics Tirandamycin and
Streptolydigin"

Covey, William Danny Inorganic T. L. Brown
Department of Chemistry, Ohio State University, Columbus, Ohio
"A Kinetic Study of Amine Substitution in Pentacarbonyl(Amine) Molybde-
num(0) Complexes"

Dammann, Laurence Glenn Organic N. J. Leonard
Mobay Chemical Company, New Martinsville, West Virginia
"The Synthesis and Chemistry of Cytokinins"

Harned, William Howard Organic D. E. Applequist
Division of Entomology, University of California, Berkeley, California
"Polyphotochlorination of Neopentane"

Heaton, Richard Clawson Analytical H. A. Laitinen
Los Alamos Scientific Laboratory, Los Alamos, New Mexico
"Electrochemical Reduction of Methylmercury in Aqueous Solution"

Henderson, Richard Elliott Lee Organic N. J. Leonard
Searle Laboratories, Skokie, Illinois
"Reactions of Diethyl Pyrocarbonate with Nucleic Acid Components"

Huang, Der Shing Organic J. C. Martin
Department of Chemistry, State University of New York, Buffalo, New York
"Neighboring Group Participation and Solvent Cage Effects in Peroxide
Oxygen-Oxygen Bond Cleavage"

Lee, Cheng Hsiung Biophysical J. G. Wetmur
Monsanto Company, St. Louis, Missouri
"Kinetics of Double Helix Information with Homopolymers: Thermodynamic and Kinetic Studies of DNA-Ligand Interactions and Modified DNA"

Llaguno, Elma Cabelles Physical I. C. Paul
University of the Philippines, Manila, Philippines
"X-Ray Crystallographic Studies of Short Intramolecular Interactions Involving Sulfur, Selenium, and Oxygen"

Miller, Rodger Scott Organic J. C. Martin
Chemistry Department, Yale University, New Haven, Connecticut
"Organic Gas-Solid Reactions and the Single Crystal X-Ray Structure of 4-Chlorobenzoic Acid"

Ryan, Joan Marie Biochemistry H. E. Conrad
Department of Biochemistry, Rice University, Houston, Texas
"Structural Heterogeneity in the Lipopolysaccharide of *Salmonella newington* (Wild Type)"

Taylor, Ronald Patterson Organic D. Y. Curtin
Rohm and Haas Company, Spring House, Pennsylvania
"The Synthesis and Characterization of Aroyl and Arylsulfonyl Derivatives of Alkylpyrimidones"

Tigelaar, Howard Lee Physical W. H. Flygare
Optical Sciences Center, University of Arizona, Tucson, Arizona
"Molecular Zeeman Studies of Four-Membered Rings and Linear Coupled Molecules; Development of a Free Radical Spectrometer; and Interstellar Molecular Studies"

Ph.D. Recipients in June 1973

Adams, Jerome Thomas Organic Peter Beak
Pioneering Research Laboratory, E. I. du Pont de Nemours & Company,
Experimental Station, Wilmington, Delaware
"Mechanistic Studies of the Reactions of 3-Phenyl-2-Butyl Chloroformates and Methyl Chloroformate with Silver Hexafluoroantimonate"

Anderson, Larry Ernest Biochemistry W. O. McClure
Department of Biochemistry, University of Washington, Seattle, Washington
"Studies on Fast Axoplasmic Transport: Differential Transport of Protein
in Axons"

Dieterich, David Allan Organic D. Y. Curtin
Eastman Kodak Company, Rochester, New York I. C. Paul
"A Study of the Behavior of Several Aromatic C-Nitroso Compounds in the
Solid State and in Solution"

Ghesquiere, James Robert Organic S. G. Smith
Computer-based Research Laboratory, University of Illinois, Urbana, Illinois
"Computer Use in Teaching and Research"

Hsieh, Chuan-Kang Richard Chemical Engineering C. A. Eckert
Research Associate, Department of Chemical Engineering, University of
Illinois, Urbana, Illinois
"Molecular Thermodynamics and High-Pressure Kinetics of Polar Reactions
in Solutions"

Hutton, James Robert Biochemistry J. G. Wetmur
Harvard Medical School, Boston, Massachusetts
"Deoxyribonucleic-Ribonucleic Acid Hybridization Kinetics and Problems
Related to Base Mismatching"

Klein, William Harvey Biochemistry J. M. Clark, Jr.
Department of Biology, California Institute of Technology, Pasadena,
California
"The *In Vitro* Translation of Satellite Tobacco Necrosis Virus Ribonucleic
Acid"

Lakowicz, Joseph Raymond, Jr. Biochemistry Gregorio Weber
Department of Biochemistry, Oxford University, Oxford, England
"Quenching of Fluorescence by Molecular Oxygen in Solution-Demonstra-
tion of Nanosecond Structural Fluctuations in Biopolymers"

Law, Ping Yee Biochemistry J. M. Wood
School of Medicine, Cardiovascular Research Institute, University of Cali-
fornia, San Francisco, California
"Studies on the Mechanism of B₁₂ Coenzyme"

Lazar, Jerome Miles Biochemistry J. M. Clark, Jr.
Department of Biology, University of Rochester, Rochester, New York
"Studies of Initiation of Protein Synthesis and Activating Enzyme: tRNA
Complex Formation"

McCabe, James Reid Chemical Engineering C. A. Eckert
Chevron Research Corporation, Richmond, California
"High-Pressure Kinetic Studies of Solvent and Substituent Effects on a
Diels-Alder Reaction"

Pumplin, David William Biochemistry W. O. McClure
Research Associate, University of San Juan, San Juan, Puerto Rico
"The Effects of Black Widow Spider Venom and Cytochalasin-B on the Re-
lease of Acetylcholine from Superior Cervical Ganglia of Rats"

Rock, Steven Lee Physical W. H. Flygare
Rohm and Haas, Philadelphia, Pennsylvania
"Molecular Rotational Zeeman Effect and Supersonic Nozzle Beam-Micro-
wave Spectrometer Studies"

Spike, Thomas Edward Biochemistry Jack Gorski
Private Business, Oakley, Michigan
"Studies on the Mechanism of the Demethylation of the 14 α -Methyl Group
of Lanosterol"

Stewart, James Lockhart Biochemistry Gregorio Weber
University of California at Los Angeles, West Los Angeles, California
"The Influences of Small Molecules on the Renaturation of Reduced Bovine
Serum Albumin"

Wang, Jing-Kong Priestley Chemical Engineering H. G. Drickamer
Research Associate, Department of Chemistry, Vanderbilt University,
Nashville, Tennessee
"Electronic Transitions and Intramolecular Rearrangement under High
Pressure"

Williams, John Wesley Organic R. M. Coates
Department of Zoology, University of Illinois, Urbana, Illinois
"Part I. An Investigation of Intramolecular Oxygenation. Part II. O-Benzyl
Monoperoxy-carbonic Acid"

Winter, Bruce Lawrence Chemical Engineering Roger Schmitz
Universal Oil Products Company, Riverside, Illinois
"An Experimental Study of an Adiabatic-Packed Bed Reactor: Steady State
Multiplicity and Related Behavior"

Ph.D. Recipients in October 1973

Boyd, Thomas Edgar Inorganic T. L. Brown
Teaching Assistant, Department of Chemistry, University of Illinois, Urbana,
Illinois
"Chemistry and Bonding in Substituted Cobalt Carbonyl Complexes"

- Broccardo, Michael Inorganic J. K. Beattie
 Johns-Manville, Research and Development Center, Denver, Colorado
 "Electron Transfer Reactions of Cobalt Complexes"
- Byon, Jae Hwang Chemical Engineering C. A. Eckert
 Texas Instruments, Inc., Dallas, Texas
 "Molecular Thermodynamics and High-Pressure Kinetics of Halide Exchange Reactions"
- Cappel, Carl Robert Organic R. M. Coates
 Eastman Kodak, Rochester, New York
 "Synthesis and Study of the 8-Tetracyclo-[4.3.0.0^{3,5}.0^{4,7}]Nonen-2-YL Cation: A New C₉H₉⁺ Isomer"
- Chang, Min Chemical Engineering Roger Schmitz
 Research and Development Department, Engelhard Industries Division,
 Engelhard Mineral & Chemical Corp., Menlo Park, Edison, New Jersey
 "Experimental Study of the Stability of a Nonadiabatic Chemical Reactor"
- Chien, Yueh-Hsiu Biophysical Gregorio Weber
 Department of Biochemistry, Brandeis University, Waltham, Massachusetts
 "Fluorescence Study of Aspartate Transcarbamylase"
- Chiu, Vincent Chung-Kwong Physical H. G. Drickamer
 Teaching Assistant, Department of Chemistry, University of Illinois, Urbana,
 Illinois
 "High-Pressure Studies on Mixed Valence System"
- Clark, Freeman Gerald Chemical Engineering C. A. Eckert
 C. F. Braun and Company, Alhambra, California
 "Molecular Thermodynamics and Phase Equilibria in the Propane-Methyl Chloride System"
- Cundall, Robert Lewis Organic N. J. Leonard
 Department of Chemistry, University of Illinois, Urbana, Illinois
 "Stereochemically Controlled Photoreactions of Pyrimidine Bases"
- Eaton, James Edmonds Inorganic T. L. Brown
 ARCO Technical Center, Harvey, Illinois
 "Kinetics and Mechanisms of Substitution Reactions of Alkyl-Group IV Metal Cobalt-tetracarbonyls"
- Frihart, Charles Richard Organic N. J. Leonard
 Department of Chemistry, Columbia University, New York, New York
 "An Organic Chemical and Biological Investigation of Purine Derivatives"

- Guschl, Randolph Joseph Inorganic T. L. Brown
Pigments Department, E. I. du Pont de Nemours & Company, Wilmington,
Delaware
"Ligand Exchange Studies of Methylcobalt(III) Complexes"
- Hauri, Robert John Organic W. T. Ford
3M Company, 3M Center, St. Paul, Minnesota
"Synthesis and Solvent Properties of Tetraalkylammonium Tetraalkylborides"
- Kieft, Richard Leonard Inorganic T. L. Brown
Department of Chemistry, Tulane University, New Orleans, Louisiana
"Nuclear Magnetic Resonance Studies of Organometallic Exchange Re-
actions"
- Kildahl, Nicholas Kent Inorganic R. S. Drago
Department of Chemistry, The Ohio State University, Columbus, Ohio
"Proton Magnetic Resonance Studies of Transition-Metal Systems"
- Kim, Hasuck Analytical H. A. Laitinen
Research Associate, Department of Chemistry, University of Illinois, Urbana,
Illinois
"Photoeffects at Polycrystalline Tin Oxide Electrodes"
- Larossa, Robert Anthony Inorganic T. L. Brown
Research Laboratories, Eastman Kodak Company, Rochester, New York
"Nuclear Quadrupole Resonance Studies of Cobalt(III) Complexes"
- Lenox, Ronald Sheaffer Organic J. A. Katzenellenbogen
Department of Chemistry, Wabash College, Crawfordsville, Indiana
"New Methods for the Stereoselective Synthesis of Olefins"
- Lunsford, Willie B. Organic W. H. Pirkle
Department of Chemistry, Northwestern University, Evanston, Illinois
"Investigations of the Photochemical and Thermal Reactions of Hindered
Spiro[.5]Octa-4,7-Dien-6-Ones"
- McMillin, David Robert Inorganic R. S. Drago
Department of Chemistry, California Institute of Technology, Pasadena,
California
"Structure and Stability of Lewis Acid-Base Adducts"
- Marks, Allen Philip Inorganic R. S. Drago
Rohm and Haas Company, Philadelphia, Pennsylvania
"Studies of Bonding and Intermolecular Interactions"

- Meeks, John Ralph Biochemistry I. C. Gunsalus
T. R. Evans Research Center, Painesville, Ohio
"On the Reaction Mechanism of Anthranilate Synthase from *Pseudomonas putida*"
- Miller, Arnold Reed Organic D. Y. Curtin
Institute for Biomedical Research, University of Texas at Austin, Austin, Texas
"Rotationally-Locked *Cis*-Diarylacenaphthenes: Syntheses and Proton Magnetic Resonance Studies"
- Miller, Craig Harrison Organic J. A. Katzenellenbogen
Chemistry Department, University of Wisconsin, Madison, Wisconsin
"Studies on the Stereospecific Synthesis"
- Moss, Arthur Zenker Physical J. T. Yardley
Textile Division, E. I. duPont de Nemours & Company, Wilmington, Delaware
"Triplet State Dynamics of Biacetyl"
- Mueller, Donald Scott Organic Peter Beak
Rohm & Haas Company, Bristol, Pennsylvania
"Thermodynamic Studies of Equilibria Between Methyltropic Isomers in Heteroaromatic Systems"
- Newcomb, Martin Eugene, Jr. Organic W. T. Ford
Research Associate, Department of Chemistry, University of California, Los Angeles, California
"Ring Openings of Cyclopropyl Anions"
- Norris, Carol Lee Sanford Physical W. H. Flygare
3M Company, Central Research Laboratories, 3M Center, St. Paul, Minnesota
"Molecular Zeeman Effect Studies and Time Resolved Infrared-Microwave Double Resonance"
- Pribula, Cheryl Deckert Inorganic T. L. Brown
Department of Microbiology, University of Illinois, Urbana, Illinois
"Spectroscopic Studies of Penta-Coordinate Organometallic Complexes"
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Rohm and Haas Company, Research Division, Philadelphia, Pennsylvania
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Wu, Chung-Yung Robert Physical J. R. Lombardi
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California
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lar Spectroscopy"

Zerger, Richard Paul Inorganic G. D. Stucky
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"Bonding and Stereochemical Studies of Group IA and IIA Organometallic
Compounds"