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Badger Chemist

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THE **NEWSLETTER** OF
THE UNIVERSITY OF WISCONSIN-MADISON

CHEMISTRY DEPARTMENT

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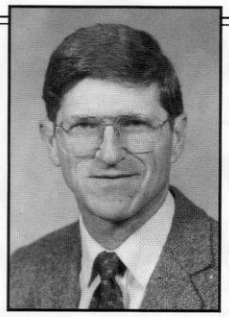


Reflections

Nineteen ninety-three was the year for large scale projects. The most serious fiscal problems in modern times forced the university into an exercise (''Strategic Planning'') to decrease in size. Post tenure review was instituted, and the university has begun working to define teaching loads. In the department, plans for a major curriculum reform project were set in motion.

Meanwhile, the department continued to move ahead. We have a new theoretical chemistry colleague, Arun Yethiraj. Reflecting the evolving interests in the department, Arun's training is in Chemical Engineering and Materials Science, his projected research applied to polymer theory. An unexpected staff change in the Instrument Center saw the loss of Dick Fronko and the addition of Charles Fry, who came with a broad range of NMR experience in industry. The Chemistry Instrument Center is in the midst of its largest ever upgrade, the result of receiving three grants that will partially funding the purchase of three NMRs and a mass spectrometer, close on the heels of the completion of a major x-ray diffraction upgrade. This seemed like a good time for a detailed report on this facility; this is one of the features of this issue of the Badger Chemist. There were several major awards to faculty and staff members, highlighted by Chuck Casey's election to the National Academy and Jim Taylor's receiving a university chair. Two promotions to tenure went through successfully.

Teaching excellence continues. Jim Weisshaar became the 9th department faculty member to receive a university teaching award. Undergraduate enrollments were up again, the fourth year in a row. We have a new honors course in organic chemistry, added to the department curriculum despite severe fiscal pressures. Chemical Education—encompassing teaching, research and service—continued its national prominence. The department is proceeding with a proposal that, if funded, will establish Wisconsin as a center to guide undergraduate curriculum reform in the next decade.

All in all it was an acceptable year for our department. When one considers the stresses on this country, on the chemistry profession, and on academia, it was even a pretty good year. We made headway on our long range plans to build a program that will meet the challenges of the next century and our goals to extend teaching and research excellence remain intact. Thus, we enter 1994 with reasonable hope to continue to move ahead. The most urgent goal for the coming year is to make significant progress on the new building. New facilities, up-to-date, meeting modern standards of operation and safety, are a key to continued achievements over the long term.

Paul Treichel

Current Chemistry NEWS

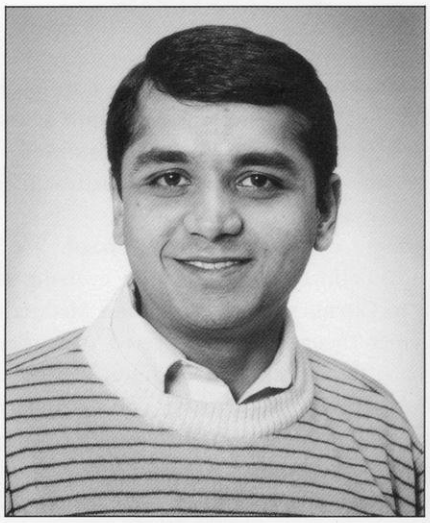
PM

New Faculty

Arun Yethiraj joined the faculty as Assistant Professor in summer, 1993. Arun was born in Perambavoor, India, and has been moving westward and northward ever since. His scientific background includes the degrees in chemical engineering: B. Tech. from the Indian Institute of Technology in Bombay, 1985, an M.S. from Louisiana State U. in 1987, and a Ph.D. from North Carolina State U. in 1991. From 1991-3 he was a postdoctoral research associate at the U. of Illinois at Urbana in materials science.

Arun's research is in theoretical chemistry. His specific field of research is polymer theory, with current work focusing on polymer-solid interfaces, charged polymers (including proteins), the stability of colloidal dispersions, the mixing properties of polymers, and phase behavior of liquid crystal polymers, using the techniques of computer simulation and liquid state theory.

Arun is a member of the Theoretical Chemistry Institute and will teach physical and theoretical chemistry. His background and research interests add another important dimension to the department as we prepare to address the challenging research problems of the next century.



Arun Yethiraj

Promotions

We are very pleased to report that both Sam Gellman and Clark Landis were promoted to Associate Professor with tenure; these appointments were effective July 1, 1993.

Sam's outstanding record at Wisconsin includes a Sloan Fellowship, PYI Award, an ONR Young Investigator Award, an American Cancer Society Junior Faculty Award, and Searle Scholar Award. He has built a strong research group; at the time of tenure deliberation, 15 students were in his group and three additional students had already completed Ph.D. degrees. His research program is on fundamental problems involving non-covalent interactions (especially as applied to biomolecules) using the techniques and strategies of modern physical organic chemistry. His program includes specific projects studying hydrogen bonding, designing molecules that change shape depending on their environment, and carbohydrate recognition.

Clark Landis's research has addressed the problem of determining structures of metal complexes in solution. His approach to this very important but difficult problem involves a combination of 2D NMR techniques and molecular modeling. To date, his work has focused on species that serve as homogeneous catalysts, but the techniques he is developing also have wide applicability in other areas of chemistry. Clark, as you may recall, came to Wisconsin with previous experience both in industry (Monsanto) and academia (U. Colorado). While at Colorado, he received a Dreyfus New Faculty Award.

Both Sam and Clark are important contributors to the instructional program. During the spring semester, 1993-4, Sam will be teaching a newly created honors section of undergraduate organic chemistry. Clark has taken charge of Chemistry 108, a one semester general chemistry course; he also redesigned the core inorganic graduate course in inorganic theory that Dick Fenske taught for many years. Clark is also one of the six faculty members leading the curriculum reform project *(see Overview, page 14)*.

Other News

►Chuck Casey was at the Technical University in Munich last summer, in Professor Wolfgang Herrmann's laboratories, with support provided by a Humboldt Senior Scientist Award.

►Phil Certain's appointment as Dean of the College of Letters and Sciences was announced on March 2, 1993 and he formally assumed this position on July 1. L&S is the university's largest college, housing 45 departments, 17,000 undergraduates and 5,000 graduate students. In an interview with Wisconsin Week, Phil identified curriculum reform, at both undergraduate and graduate levels, as having a high priority in his agenda.

►As this edition of the Badger Chemist is being written, we are getting ready for Glen Dirreen's retirement in mid-January. Glen has been a member of the department since the late 60s and an academic staff member in the department for almost 22 years. He first came to the department for a summer institute for high school teachers. However, he stayed on as a graduate student, doing inorganic chemistry research with Paul Treichel, and

receiving his Ph.D. in 1972. At that time he was picked to fill the newly created position of General Chemistry Laboratory Director, a position he would hold for 12 years. After that, he was Coordinator of General Chemistry and Associate Director of ICE for several years, before dropping the Coordinator position to spend full time on ICE activities.

►Mark Ediger was awarded Bethel College's 1993 Young Alumnus Award. During the summer, 1993, Mark traveled in Germany, France, and Spain and presented talks at several universities and institutes. He helped organize a meeting in Spain on relaxations on complex systems. He also presented invited talks to the Akron Polymer Lecture Group, National APS meeting, a German-US symposium, and a solid state NMR conference.

►Art Ellis coauthored "Teaching General Chemistry: A Materials Science Companion" with Professors George Lisensky (Beloit College), Maggie Geselbracht (Reed College), and Bill Robinson (Purdue U.). This book, published by ACS Books, is intended to help revitalize introductory chemistry courses by making solids, including high tech materials and advanced devices, an integral part of the course. Art presented the Steiner Lecture at Oberlin College, gave a plenary lecture at the International Conference on Chemical Education in Bangkok, and with George Lisensky gave the plenary lecture and conducted a workshop for the "Partners in Science" program, sponsored by Research Corporation, in Tucson.

►Tom Farrar concluded his year as a rotator at NSF and returned to active duty in the department in September.

DICK Fronko resigned his position as Director of NMR Laboratories in August 1993 and has taken employment at Microcide Pharmaceuticals, Inc., in Mountain View, CA. This company is less than a year old, and the NMR lab that he will manage is just being set up. In the meantime, he also has the role of acting Safety Officer and manages the Chemistry Division inventory and ordering. Dick's decision to move to California came about because of his marriage last summer to Darlene Vander Zon, an employee at Varian Instruments.

►Dick was replaced as NMR Laboratory Director by Charles Frey *(see page 5).*

►John Moore's activities during the year included attending two ACS Meetings as member and vice-chair of the ACS Society Committee on Education, as ACS Councilor, and as a member of the Executive Committee of the ACS Division of Chemical Education. He attended and gave a plenary talk at the MACTLAC Meeting (Midwest Association of Chemistry Teachers at Liberal Arts Colleges) and represented the Institute for Chemical Education and spoke about its long history of outreach activities at the AAAS Meeting, held in Boston in February. John also saw the publication of a new general chemistry text on which is is a coauthor. Entitled "The Chemical World," this Saunders Publishers text takes a first step toward trimming the length to a more manageable size and builds in activities that enable students to become active participants in learning.

►In April, John Moore represented the department at a meeting of state legislators where he described the "Lake Study" simulation (co-authored by David Whisnant, Ph.D. '71, Hirschfelder) that is now used by all students at the beginning of Chemistry 103. As a result of this meeting the legislature made it possible for the university to incorporate a tuition surcharge to fund computing and make computers much more widely available to undergraduate students.

►Hans Reich traveled in Germany, Switzerland, Austria, and Italy over the summer, giving lectures at several universities and presenting a talk at the Third International Symposium on Carbanion Chemistry.

►Dan Rich spend about six weeks during the summer of 1993 at the Organic Chemistry Institute at the Technical University at Munich, hosted by Professor Horst Kessler. This work was conducted with a 1993 Humboldt Research Award.

►Lloyd Smith continued a busy travel schedule in 1993. Travel outside the US included two trips to Europe (Italy and Sweden). He accumulated 55,000 air miles on 25 trips in the US alone. Accompanied by his family, Lloyd spent five days in Tennessee at the Monteagle Sunday School Assembly, through an invitation arranged by Lloyd's graduate student Mike Fitzgerald. At Monteagle he gave a general talk on the Human Genome Project, enjoyed Southern hospitality for a few days and visited the Jack Daniels distillery.

►Lloyd has also been involved this year in the establishment of a new company, Third Wave Technologies, Inc., a Madison based company located in the Faraday Center on Fish Hatchery Road. He is joined in this venture by Jim Dahlberg of Biomolecular Chemistry (a department in the Medical School, formerly called Physiological Chemistry) and Lance Fors, a friend from California. The company's primary focus is in the area of DNA-based diagnostics, and the company has a license for technology developed in Dahlberg's laboratory.

BASSAM Shakhashiri was awarded the Doctor of Science, Honoris Causa, from Grand Valley State University in May, 1993. Bassam's annual Christmas lectures went off on schedule. As usual, his two Madison lectures were standing room only presentations.

►In 1993, Jim Skinner gave talks at Garchy (France) and Jerusalem (Israel), as well as in New York, Massachusetts, Connecticut and Minnesota.

►Paul Treichel was elected to the Governing Board of the Council for Chemical Research. He has been the UW representative at CCR for seven years. He is also the chair of CCR's Scientific Human Resources Committee, which is engaged in studies on the supply and demand for scientists.

►Bob West spent two weeks as a Dozor visiting fellow at Ben Gurion University of the Negev in Be'er Sheva, Israel. He traveled to Brazil in May, and to Poland in August for the 10th International Organosilicon Symposium. The Department honored Bob's 65th birthday in September (see feature on page 9).

►In May, Howard Zimmerman gave a plenary lecture at the Organic Symposium at Kyoto University honoring Professor Kazuhiro Maruyuma. While in Japan, he also spoke at Hokkaido and Tokyo Universities. On Howard's schedule are plenary lectures at the 77th Canadian Chemical conference in Winnipeg next summer and at the Third International Conference on Solar Energy in Cairo in 1995. The current Zimmerman research group has an international flavor. Student Zhaoning Zhu from China and postdoc Andrei Kutateladze from Moscow State U. will soon be joined by postdocs from Prague and Moscow. ■

The Chemistry Instrument Center

by Thomas C. Farrar
Professor of Chemistry and
Director, Chemistry Instrument Center

SINCE Galileo's invention of the telescope, instrumentation has been a major driving force to advance science. In chemistry, instrumentation has played an especially important role in opening up new areas of research. Chemical research being carried out today would not be possible without modern NMR, IR, and mass spectrometers, x-ray and neutron diffraction instruments, gas chromatographs, amino acid sequencing instruments and a host of other modern instruments. Advances in scientific instrumentation over the past seventy years is paralleled by a similar growth in the facilities in our Department.

Professor Villiers Meloche, who joined the Department in the early 1920's, recognized the importance of chemical instrumentation and by the late 1920's had established a small chemical instrumentation laboratory on the first floor of the chemistry building. At that time, Wisconsin was already recognized as a center for chemical instrumentation, attracting a number of outstanding scientists such as The Svedberg, the famous Swedish physical chemist, who developed the modern ultracentrifuge. The first versions of his famous centrifuge were designed and built during his stay here in Madison in 1923.

Under Professor Meloche in the 1940's, Chemistry's instrumentation developed rapidly. In the late 1950's, Professor Paul Bender assumed the leadership role in developing a departmental facility. Professor Bender had arrived in Madison in 1942; he was active in the early development of Raman spectroscopy (at that time obtaining a Raman spectrum was a challenging undertaking) and in thermodynamics. Like many early infrared and Raman spectroscopists, he was impressed by the power and the potential of the newly discovered NMR spectroscopy. Professor Bender convinced the department to purchase a Varian DP-40 proton NMR spectrometer. DP stood for Dual Purpose, i.e. high resolution and wide-line (solid state) NMR. By today's standards this early instrument was almost laughably primitive in terms of sensitivity and resolution. Successful operation was part science, part art, and more than a little witchcraft. In 1961, with support and encouragement of organic colleague William Johnson, the department acquired its second NMR, a Varian A-60. It was with the addition of the A-60 that synthetic chemists began to utilize the power of NMR for structure analysis.

In the following 29 years under Professor Bender's guidance the Chemistry Instrument Center was shaped into its present form. This facility provides capabilities in NMR and ESR spectroscopy, mass spectroscopy and x-ray diffractometry for the department. At the present time, the Center contains seven multinuclear NMR spectrometers, five x-ray diffractometers, and four mass spectrometers. In addition, there is sophisticated equipment needed for the maintenance and repair. The capital investment in equipment is well over seven million dollars.

Setting the Chemistry Instrument Center apart from many others is the technical and scientific staff. During its growth, the department was successful in staffing the center with six scientists and engineers to maintain the equipment, teach students how to use the spectrometers, and collaborate with students and faculty in both simple and complex experiments.

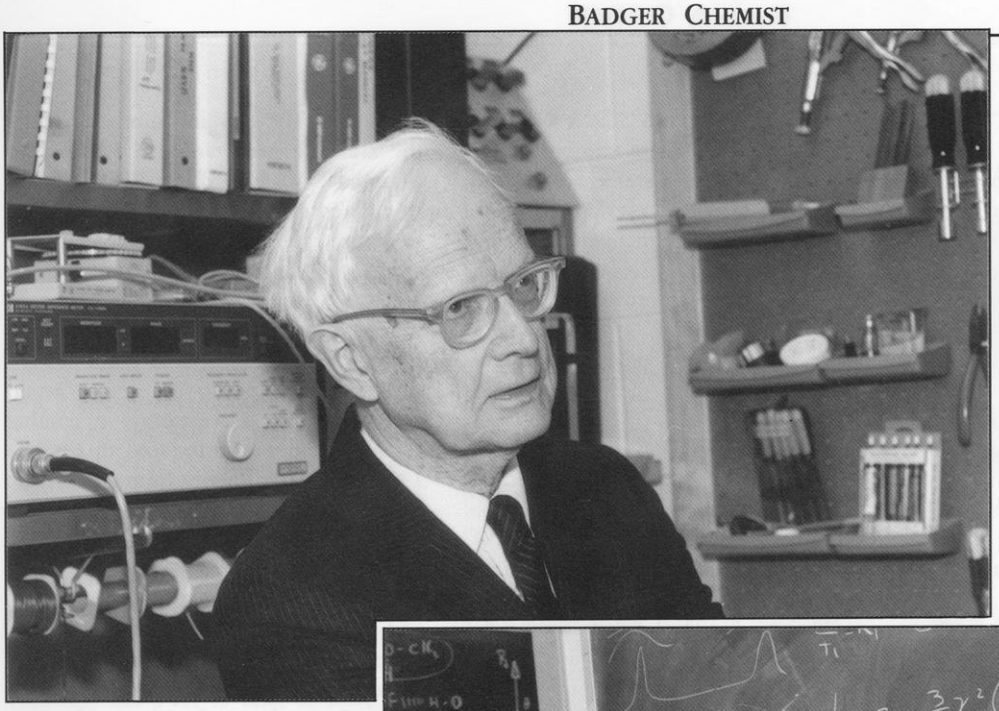
A Wisconsin hallmark, started by Professor Bender, is the philosophy that an integral part of a graduate student's education requires providing hands-on access to the most advanced scientific equipment. This was judged essential to achieve a basic understanding of how the equipment works, the sorts of information can be obtained, and the limitations and capabilities of the instruments. Well over half of the graduate students in the department, and many students from other departments, take a basic instrumentation course (Chemistry 626). Upon its completion, students are given access to the routine NMR equipment 24 hours a day, 7 days a week.

Students from 16 different research groups within the Chemistry Department have taken the advanced version of Chemistry 626 permiting them to use the facility's more sophisticated equipment. For students wanting the most complete understanding of NMR methods, a course in density matrix theory and its applications to NMR spectroscopy is offered periodically by Professors Farrar and Harriman.

The facility is currently in the process of replacing its two 200 MHz and 270 MHz spectrometers. During busy periods in the past, these three instrument have handled more that 300 samples per day. With NSF, NIH, Graduate School and Department funding, we recently purchased three Bruker AC+ spectrometers that will arrive by early March, 1994. One of the new AC+'s, operating at 300 MHz for ^{1}H, will be equipped with an automatic sample changer and quad-nucleus (^{1}H, ^{13}C, ^{19}F, and ^{31}P) detection. All four nuclei with any number of requested experiments can be run during a single period on this spectrometer in an unattended mode of operation. The second 300 MHz spectrometer will be dedicated to ^{1}H and ^{13}C experiments, and the third AC+ will operate at 250 MHz for ^{1}H, and will have capability for full broad-band, multinuclear and wide-range variable temperature operation. In addition, these spectrometers will be capable of performing routine 1D and 2D data acquisitions and analyses, selective excitation and decoupling experiments, and two-dimensional correlation spectroscopies.

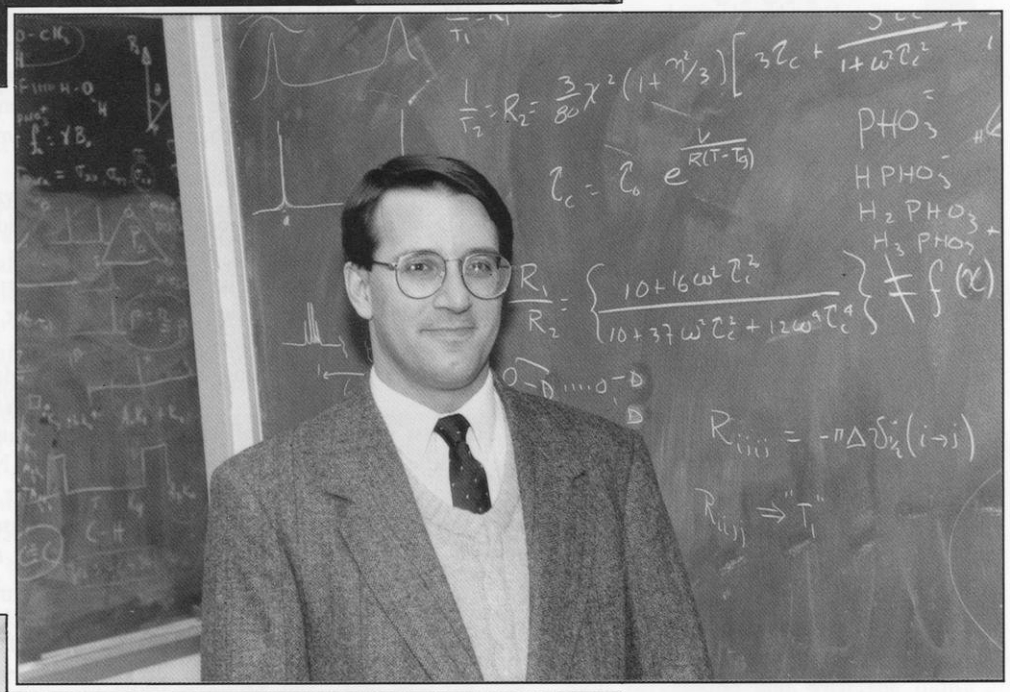
The Bruker wide bore AM-360 MHz spectrometer will continue to handle a wide range of rare-nuclei. The busiest spectrometer, the Bruker AM-500 MHz spectrometer is used in sample and concentration limited research, studies of low sensitivity nuclei, and NOE and correlation spectroscopy. The Unity-500 is dedicated primarily to multidimensional work; currently, a majority of time is spent investigating conformational properties of moderate to high molecular weight compounds such as carbohydrates and peptides. The Varian Unity-300 MHz NMR spectrometer performs a full range of measurements on solid samples: polymers, ceramics, and solid-state catalysts. The technique is especially useful for investigating compounds that are glassy or amorphous, where detailed X-ray crystallography is not possible.

Rounding out the magnetic resonance facility is a Bruker ESP-300E ESR spectrometer acquired two years ago.



Professor Paul Bender

For 29 years, the guiding light of the Instrument Center.



Dr. Charles G. Fry

Newly named Director of the NMR Laboratory in the Chemistry Instrument Center.

Instrument Center Staff

Left to Right

Doug Powell, Roger Clausen
David Snyder, Marcel Hop
Charles Fry, Chris Behme (TA)
Tom Farrar, Tom Stringfellow (TA), Marv Kontney,
Paul Bender

Middle, in back

Joe Schwartz (TA)

We have also developed NMR software, PC-NMR+, which makes more efficient use of the NMR spectrometers. Over 90% of the data reduction for one-dimensional NMR experiments is done on low cost MS-DOS computers using PC-NMR+. This software is currently in use in over 200 university and industrial laboratories in the United States and Europe.

In August, 1993, Dr. Charles G. Fry filled the vacant position of Director of the NMR laboratory in the Chemistry Instrument Center. Born and raised in the southwest, Charlie received his B.S. degree in Physics and Chemistry at the U. of Arizona in 1978. After a brief work hiatus where he claims he earned enough to get married, he proceeded, with spouse, to Ames, Iowa, receiving his Ph.D. in Physical Chemistry in 1985. In his thesis work with Prof. Bernard Gerstein, Charlie used solid-state nuclear magnetic resonance to study the effects of hydrogen bonding arrangements on the semiconductor properties of amorphous silicon hydrides. He then joined McDonnell Douglas Research Laboratories as Research Scientist. His research there involved the use of NMR in studies of polymer cure mechanisms and kinetics, polymer dynamics, and polymer degradation, high temperature ceramics and ceramic fiber coatings. During that time, he was principal investigator on a number of contracts pursuing nuclear magnetic resonance imaging as a nondestructive evaluation technique in the aircraft industry.

The Instrument Center's Diffraction Laboratories have also seen improvements in the last several years. The most significant change occurred with the purchase of a Siemens rotating anode x-ray generator and two new single crystal diffractometers. This generator produces a flux which is about five times stronger than the flux from sealed-tube generators, allowing examination of smaller crystals than ever before. At the time the new equipment was installed, two older single-crystal diffractometers were completely reconditioned. All four instruments are driven by stepper motors, more accurate at positioning the sample than the previously-used DC motors. New Siemens software automates nearly all steps in data collection.

Crystal structures are now solved and refined primarily on two Silicon Graphics Indigo computers. These computers are more than 30 times faster than the old MicroVAX II computer previously in use. A newly released refinement program allows the use of data sets too weak for previous programs. Improved instrumentation, data collection, and refinement software has led to a near doubling of the number of structures determined per year.

Two software packages are installed in the X-ray lab. The Cambridge Structural Database that previously resided in the Computing Center was moved to one of the x-ray computers. It is extensively used by students in Chemistry, Biochemistry, and Pharmacy. The Sybyl molecular mechanics system of programs was installed on one of the Indigo computers. This capability complements the growing number of molecular mechanics and molecular modeling programs in the department.

Dr. Douglas Powell, Director of the X-ray Laboratory, has held that position for five years. He received his Ph.D. in physical chemistry from Iowa State U. and was a post-doctoral fellow at the U. of Oklahoma before coming here.

THE mass spectrometry laboratory is in the middle of a major upgrade. Up to two years ago, the lack of several ionization and sample introduction techniques limited the range of compounds which can be analyzed. In 1991, Amoco donated one of their older high resolution instruments, a VG Analytical ZAB-2F, to our department. This has been operational here since early 1992 and is mainly used for sample analysis via fast atom bombardment (FAB). The FAB technique allows ionization of thermally labile molecules and molecules with a molecular weights in excess of 2,000 amu. Currently, one out of every five samples in the mass spec lab is analyzed using FAB.

In May 1993 we learned that our proposal to NSF to purchase a new high resolution instrument was successful. After careful evaluation a VG Autospec was ordered in November; this instrument is expected to be operational in March, 1994. In addition to traditional electron impact ionization, the instrument allows chemical ionization, liquid secondary ion mass spectrometry (SIMS) and electrospray ionization. The new instrument increases the available mass range to 5,000 amu.

Liquid SIMS is similar to FAB; the only difference is that cesium ions are used to ionize the samples instead of xenon atoms. It will be possible to perform liquid SIMS in the continuous flow mode instead of the static mode; this allows connecting the liquid SIMS probe directly with a syringe pump or even a liquid chromatograph. Electrospray is another LC/MS technique introduced in the late 1980's. The effluent from a syringe pump or LC is sprayed into the ion source via a needle, which carries a potential creating an aerosol of small charged droplets. The solvent evaporates and is pumped away leaving ionized sample molecules. This mild technique ionizes large molecules without fragmentation. It can be used with samples having molecular weights in excess of 50,000 amu. The technique will be useful in analyzing peptides, proteins, oligosaccharides and oligonucleotides, that five years ago were beyond reach for mass spectrometry.

Dr. Marcel Hop is the Director of the Mass Spectroscopy Laboratories, He came to Madison two years ago from the U. of Waterloo in Canada, where he obtained his Ph.D. Dr. Hop is originally from the Netherlands.

Mr. Marvin Kontney and Mr. Roger Clausen, our electrical engineers, play a vital role in the Center. Marv is responsible for keeping the NMR spectrometers in top operating condition. He is justifiably proud of the fact that spectrometer down-time is less than 5%. This is an impressive record, considering that over 150 different graduate students, post-doctoral associates and faculty members make regular use of the equipment. Roger has his hands full keeping the mass spectrometers and the x-ray diffractometers in top condition. He and Doug Powell have worked with Siemens' engineers sorting out a number of problems with some of the newer Siemens instruments.

It is clear that state-of-the-art scientific equipment will continue to play an important, essential role in modern chemistry. We are proud that Wisconsin traditionally has one of the best chemistry instrumentation laboratories in the country, and pleased that we can provide hands-on access to the equipment.

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Teachers Teaching

In the past, Laura Lerner had brought in current research papers for discussion in her Chemistry 565 class, to convince students that biophysical chemistry was an interesting and active subject. During Spring, 1993, however, Chemistry 565 took on additional dimension. With funding from the Brittingham Trust, Laura brought a series of visiting scientists from around the country into her class, to give lectures and interact with students. She wanted to put the students in touch with real researchers. Her goal was to show them that everything in science is not known, that one must often look at science with a skeptical eye, and that chemistry has a lot to offer to solve problems in other areas such as biology. Student response to the course format was enthusiastic.

Wisconsin has moved into a new age of information transfer. Funded by a 1% tuition surcharge and quality reinvestment funds, the Division of Information Technology (with the catchy acronym DoIT) now offers free electronic mail accounts to all students on campus. Students can access the network either through university computer labs or with home computers via modem. Many campus faculty, including Art Ellis, have used this service to facilitate student-faculty interactions. Art asked his students to E-mail him questions on material from his class so that he can respond at the next class period.

The general chemistry laboratory program continues to undergo change under the direction of Lab Director Lynn Hunsberger (Ph.D. '90, Ellis). A series of modified experiments that are more open ended and require much better prelab preparation on the part of students was first introduced to the 2200 students in Chemistry 103 in fall. Lynn is also developing a new, project oriented approach to Chemistry 104 labs. Students will work on 2-4 week projects related to environmental or other real-world concerns. Lynn is also working with Jerry Jacobsen of the Project SERAPHIM staff on video materials that can be incorporated into computer/multimedia tutorials for the laboratories. By this time next year we expect that some of these will be in use.

PBS Series Boosts Chemistry Image

Ed. note: I saw Dick Hess's name mentioned in the announcement for "The Stuff of Dreams," a three part PBS TV series sponsored by Dow Corning Corp. on the applications of chemistry. I tuned in, to learn whether this was the Dick Hess who had been one of my early students; and indeed it was (Ph.D. '71). I wrote to him soon after the broadcast and received a lengthy response, some of which is abstracted here.

"FROM 1979 to 1983, I was research manager in White Pigment and Minerals Products with responsibility for technical work at five plant sites, one mine and one experimental laboratory. In 1983, I transferred to Textile Fibers Department, first as research manager in carpet fibers end-use research, then as departmental planning manager, then as research manager of technical planning. The latter position I have had in one form or another for the past eight years ...[while]...serving under three VPs of R&D. One might say I am one "thread" of technical continuity within the fibers technical community.

"It was in that capacity that I was asked to participate in the WNET program by a DuPont public affairs person who had heard me talk on several occasions about the evolution of materials science and where the polymer-based portion of that work was heading. I had very little interaction with the producer and writer/director prior to them showing up at DuPont for a full day of shooting in early March. All I knew was they wanted a "scientific explanation" for some of the materials they were going to be talking about during the program. It turned out that much of the filming of people using the materials had already been shot. Using the scientific computing center at the Experimental Station as a backdrop, with some Cray calculated simulations of DuPont polymers to add "color," I was interviewed for about six hours.

"It was not enjoyable, since I did not know what the director was going to ask me, nor did I have a very clear notion of what was in her head as context for the questions. In addition, much of my scientific vocabulary was unavailable to me—the director did not have a technical background and what she didn't understand she assumed her audience wouldn't either. So, much of the time was spent "trying out" answers using everyday 6th grade English. At the end of the day, I was totally exhausted and not attracted by the thought of a new career in the media.

"Despite all of this, I believe that I was influential in bringing in the notion that we are really at a point in our technical knowledge of materials and their functionalities, that we can now "design to function." That was a novel thought to the director at the beginning of our interview, which, judging from the final production, became the linking theme throughout the program. She even got Mary Good to say it in the followup interview with her."

Slow Progress on Building Plans

Two years ago, the State approved $1.4 million in planning funds for this project. To date, almost none of this money has been spent.

In part, this has been the result of a detour taken last fall. As reported in BC #37, the university (in a decision strongly supported by the department) decided to look into the possible acquisition of the Methodist Church property for the new building. The property, occupying one-fourth of the block on which the Chemistry building stands, would be much more suitable for a project of the scope envisaged. Building on the much smaller site lying just west of the Mathews Research Building, the original plan, has some major disadvantages.

Our hopes were encouraged by early indications that the church was amenable to moving. This was important because an attempt to obtain this property would be made only if a mutually satisfactory agreement was considered possible. From that initial contact to final decision is a long road, however. Purchase by the university would need support of the church's board as well as the agreement of the Wesley Foundation, the actual owner. It was clear that an agreement would be reached only if an alternate on- or near-campus site could be found so the church could relocate. There was also environmental assessments and the concern that an old house on that site, currently in use by the church, was an historic landmark.

A purchase price cannot exceed the appraised value when state funds are used. On the surface, this is a reasonable requirement, but it is hard to get a meaningful assessment of value. There are few alternative uses for this property; in reality, the property has major value only to the university and the church and this makes the university the only likely buyer. A meaningful assessment should realistically be what a willing seller (the church) and a willing buyer (the university) could agree upon.

Nonetheless, to make an offer for the property an independent appraisal was required. In the end, two appraisals were obtained; one was around $800,000, the other near $1,200,000. In April, with these data, the university was prepared to suggested a purchase price around one million dollars. Unfortunately, to the church this amount was unrealistic low. No agreement would be reached, although the university and the church agreed to continue discussion.

The only way to provide the amount needed for this purchase would be if a benefactor were found who would buy the property (independent of state restrictions) and then donate it to the university. This strategy had been used before, but with no donors in sight, this didn't sound like a good plan to pursue. Faced with this state of affairs, the department decided that its best interests lay in pressing ahead on the original plans so, in May, we declared this to be our preference. Since the department needs have created a project costing about $50 million, we proposed to proceed in a two phase project. The first phase would have to be a $31.4 million project (the amount defined originally), addressing the most critical departmental needs—mainly more space and upgraded research labs for synthesis. A second phase would then have to be created to address the remaining parts of this project.

In our opinion, the decision to seek to buy the church property had been a good idea. When this plan fell through, the decision not to continue to pursue this very uncertain option was seen as an equally good idea.

We thought that this was straightforward, but as the summer passed, there was no indication of activity. Eventually we learned that the State's Department of Facility Development, the group with the checkbook, was reluctant to release the planning funds. They felt that the university did not have a clear plan; and furthermore, they were reluctant to proceed on a first stage that implied that future state funding would be required. They also suggested that the scope of the project had changed. If that idea were to take hold, it would mean that we would have to again seek approval from the State Building Commission. This sounded very much like a giant step backward.

But, as the year closed, there were several hopeful signs. Flad and Co. architects assigned to this project, finally obtained approval from the DFD to proceed on a "10% design report". They had used this strategy before, with success, to dislodge projects stuck in similar positions. A 10% design report moves forward on the planning far enough to provide the information needed to assess various available options.

Flad's report is due in March. Preliminary information suggests that this report will be in line with the department's recommendations.

An even more hopeful step was taken as the university began preparations to approach the Vilas Trust for a majority of the matching funds needed for this project. The request will be sent ahead during February; in March (just as BC #38 is being printed) we may have a definite commitment on the necessary matching funds.

In addition, newly appointed L&S Dean Phil Certain has taken an active role in this project. This is something that neither the previous dean or the acting dean had done over the last three years. In retrospect, this may be a significant cause for the delays we have experienced. Phil's leadership could help catalyze university decisions on this project.

West Symposium

One hundred twenty persons, including over 90 students and coworkers, were on hand in Madison on September 11 to participate in the Inorganic Division's symposium honoring Bob's 65th birthday. The formal program featured six lectures and poster session with 45 contributed papers.

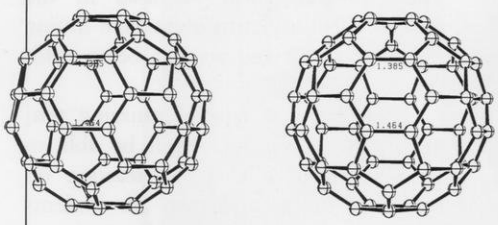
Lectures were presented by Josef Michl, of the U. of Colorado, former students Joyce Corey (U. Missouri at St. Louis), Phil Boudjouk (U. of North Dakota), a former coworker Professor Eiji Osawa (Toyohashi U.), and current postdoc Dr. Michael Denk. The lecture program concluded with Bob talking about his recent work on fullerenes. A banquet that evening rounded out the program; Tom Barton, who flew in from Iowa State to be MC, lead a memorable roasting.

1966-1967 Eiji Osawa (Toyohashi University of Technology)

Work at West Group

Preliminary work towards the synthesis of deltic acid $C_3O_3H_2$

Recent Work The first AM1-optimized structure of Buckminsterfullerene, 1987, in stereo view for crossed eyes.

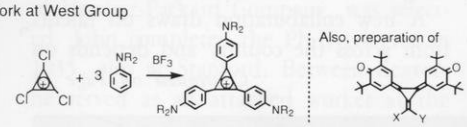


Bob, congratulations for a happy 65th birthday!

四口ハート先生
65才誕生日おめでとう
(日本ウエストグループ)ございます

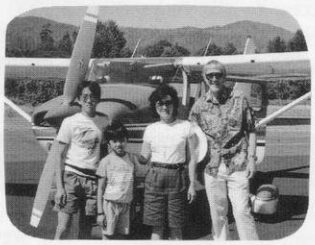
1975 - 1976 KOICHI KOMATSU (Inst. for Chemical Research, Kyoto University)

Work at West Group



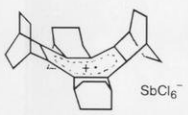
Also, preparation of

and FOOSEBALL!!

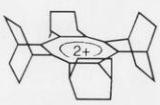


Recent work

Hydrocarbon Ring Systems with Novel Properties

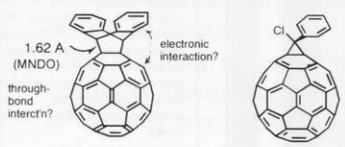


The 1st stable COT cation radical isolated as a ***single crystal***



The 1st stable COT dication observed ***at room temperature***

Bucky Ball Derivatization



Congratulations to Bob, the great climber, the great runner, the great pilot, the great Haiku writer, the great revolutionist, and the ***great CHEMIST!!***

One of the more interesting poster presentations was a series of reports on the work done by Bob's former colleagues in Japan. Two special contributions in this group are reproduced here.

This symposium was emphatically not offered as a retirement celebration. Bob's research program is moving at full steam and producing some of his most outstanding work at the present time.

On September 17, 1994 the Inorganic Division will try to duplicate this success with a 65th birthday celebration for Larry Dahl. Information will be forthcoming in mid-spring. These two symposia are the first steps to creating an annual divisional colloquium series. Actually, the Division runs out of birthdays to celebrate after the Dahl Symposium. However, there is hope that we will be able to build up a fund for that purpose; the Division is currently seeking donations.

ICE & SERAPHIM

Betty Moore, Assistant Editor
JCE: Software Program Manager
Project Seraphim

Electronic Publishing

The Journal of Chemical Education: Software, our venture into electronic publishing that has just completed its 6th year, has developed and released instructional materials in chemistry for three hardware platforms (IBM PC, Macintosh, and Windows on IBM PC) and videodisc. Subscribers include approximately six thousand teachers of chemistry in colleges, universities, and high schools worldwide.

Although JCE: Software authors hail from around the world, many of the programs published were the result of collaborations with faculty in other institutions who visit Wisconsin for periods from a week to a year. Wisconsin based activities included:

Richard Cornelius, visiting from Lebanon Valley College in Annville, PA. developed a series of programs called "AnswerSheets", for Windows on IBM PC and for Macintosh. While using the power of Microsoft Excel, the screen appearance is far from that of a spreadsheet. The first four programs in the series have been published: "Unit Conversions"; "Significant Figures"; "VSEPR Structures"; and "Stoichiometry".

Bill Robinson from Purdue spent a full year in Madison, working with Art Ellis' and John Moore's groups. Throughout much of his teaching career Bill has been concerned with presenting and teaching solid state and crystal structures, so it seemed natural that he would try to harness the dynamic nature of the computer to present this subject. A pair of programs, "A Window on the Solid State" are being readied for publication in 1994, one for faculty to demonstrate and a companion tutorial for students. These programs will be used in the general chemistry curriculum here during the current year and are also being field-tested at Purdue.

Users of a new type of quizzing program called "VizQuiz" will be able to show video of a chemical reaction on computer screens and then ask students questions about what they have observed. Or a graphic could show the structure of a molecule, the student could manipulate the structure around all three axes, and then questions could be asked about that structure. The "VizQuiz" program was written by Jay McCormick of our staff and visiting Fellow Bob Allendoerfer from the faculty of SUNY-Buffalo.

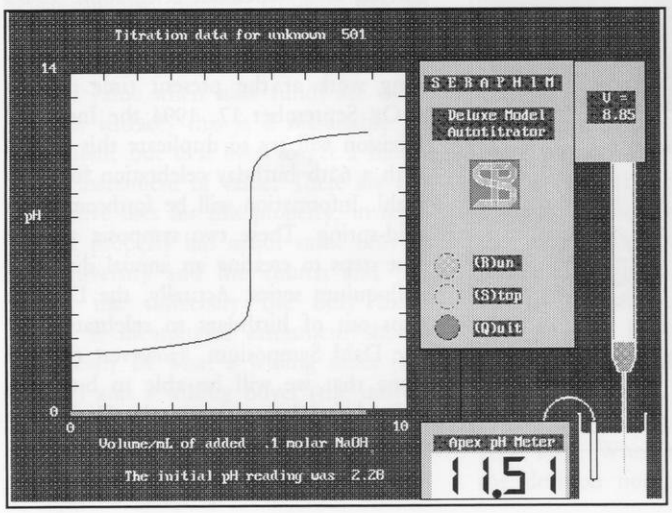
A collaboration between Paul Schatz, Director of the Organic Laboratories, and Jerry Jacobsen, formerly of IBM Madison and now of our staff, has resulted in the completion and publication of a major program, a computerized index covering the entire 70 years of publication of the Journal of Chemical Education. "Computerized Index, Journal of Chemical Education, Volumes 1-69" allows rapid access to the more than 21,000 citations, either via HyperCard on the Macintosh or via Windows using ToolBook on the IBM PC.

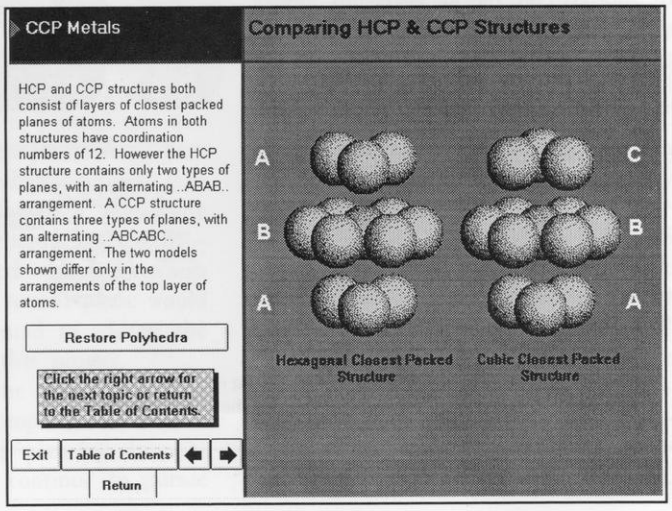
Richard Ramette from Carleton College was a SERAPHIM Fellow in 1989 and since then has been a steady collaborator and contributor. Since his recent retirement he has increased his activity level significantly, writing more programs and making frequent visits to Madison. The "Acid-Base Package", written in collaboration with staff member Jon Holmes, performs all of the types of acid-base calculations normally encountered in introductory and analytical chemistry courses. "KinWORKS: A Learning Tool for Kinetics Lab" helps students learn how to design chemical kinetics experiments, collect and analyze kinetic data, and draw conclusions from those data. Both of these programs were completed, tested, and published in 1993. Two more programs are currently in the output queue: "REACT: Practical Thermodynamic Calculations" and "Titrate". If we stay on schedule, both should be published in 1994.

There was also continued collaboration with other "regulars" David Whisnant (Ph.D. '71, Hirschfelder) of Wofford College, whose latest publication is "Bonding Theory/The Werner-Jorgensen Controversy", and Frank Rioux of St. John's College, who wrote "Enriching Quantum Chemistry with Mathcad". During the year, Gary Trammell's collaboration paid off with the publication of a 60-minute videodisc, "Demonstrations in Organic Chemistry". Gary is on the faculty of Sangamon State University.

A new collaboration draws on talents from across the country and depends on

Continued on Page 21





A LONG WAY FROM THE YUKON

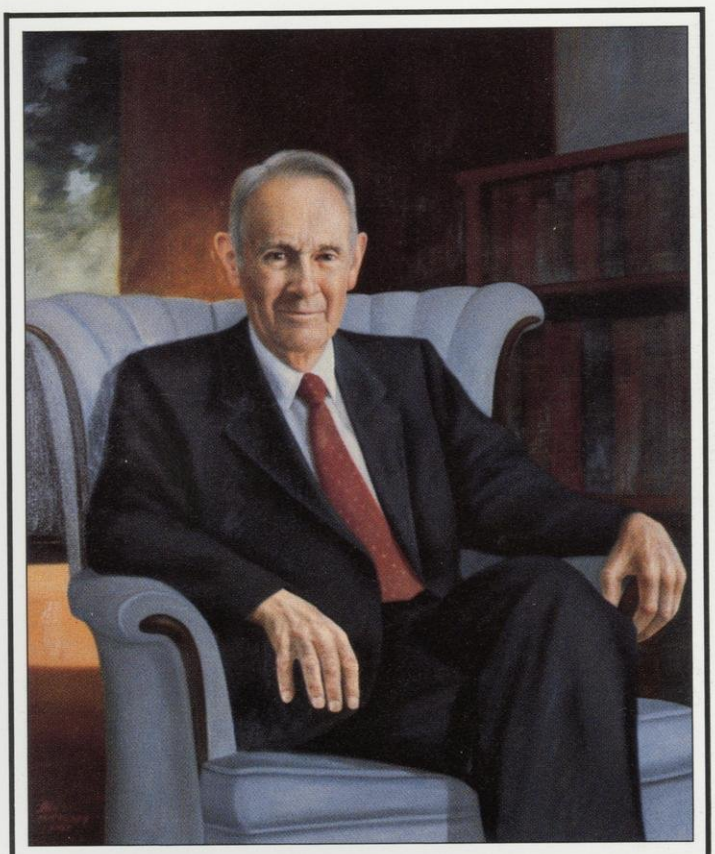
JOHN D. Ferry was born at Dawson in the Yukon Territory of Canada; he made his appearance on May 4, 1912, and spent his first two years in log cabins in that immediate area, since his father was a civil and mining engineer specializing in prospecting for placer deposits. Most of his childhood was spent in small mining communities in Idaho and Oregon; he completed the eight grades in four years at a one-room school in the ghost town of Murray, Idaho, with what John describes as "somewhat uneven training."

The town of Murray was similar to Dawson in that they were snowed in from November to May. A trip to the doctor was an all-day affair by horse-drawn sleigh over two mountain passes. During high school he taught himself enough Latin and German to later go into advanced classes on these subjects. This fascination with language has persisted as his most extensive avocation; he claims to be more interested in comparative philology and phonetics than in facility in speaking or reading, but in his extensive travels he always ordered breakfast in the local language!

John received the AB degree at Stanford University in 1932. In those days Stanford's Department of Chemistry each year selected and prominently displayed on a silver cup the name of the outstanding freshman chemistry student. In 1929 John's name was posted; in 1930 David Packard, who later became the Packard of Hewlett-Packard Company, was selected. John completed the Ph.D. degree in 1935, also at Stanford. Between degrees he served as an attached worker at the National Institute for Medical Research in London, working on the general problem of ultrafiltration of proteins.

John's first employment after graduation was as a private research assistant at the Hopkins Marine Station of Stanford University, where he worked for a year with Dr. David Spence. He then served as instructor and tutor in biochemical sciences at Harvard University, and subsequently became a Junior Fellow of the Society of Fellows at Harvard. During the war years he held a joint appointment at Woods Hole Oceanographic Institute and the Harvard Medical School. At

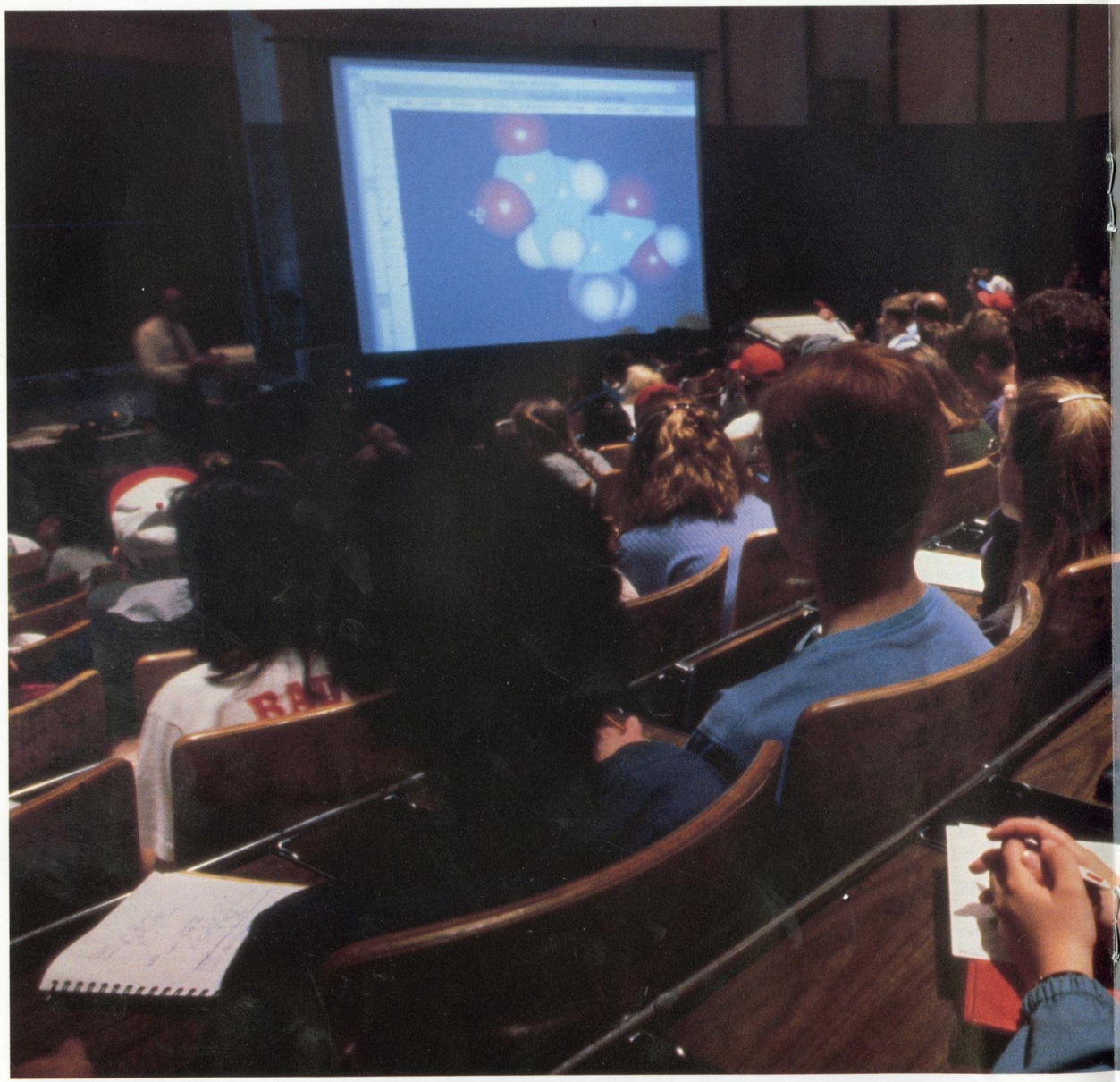
(continued on page 19)

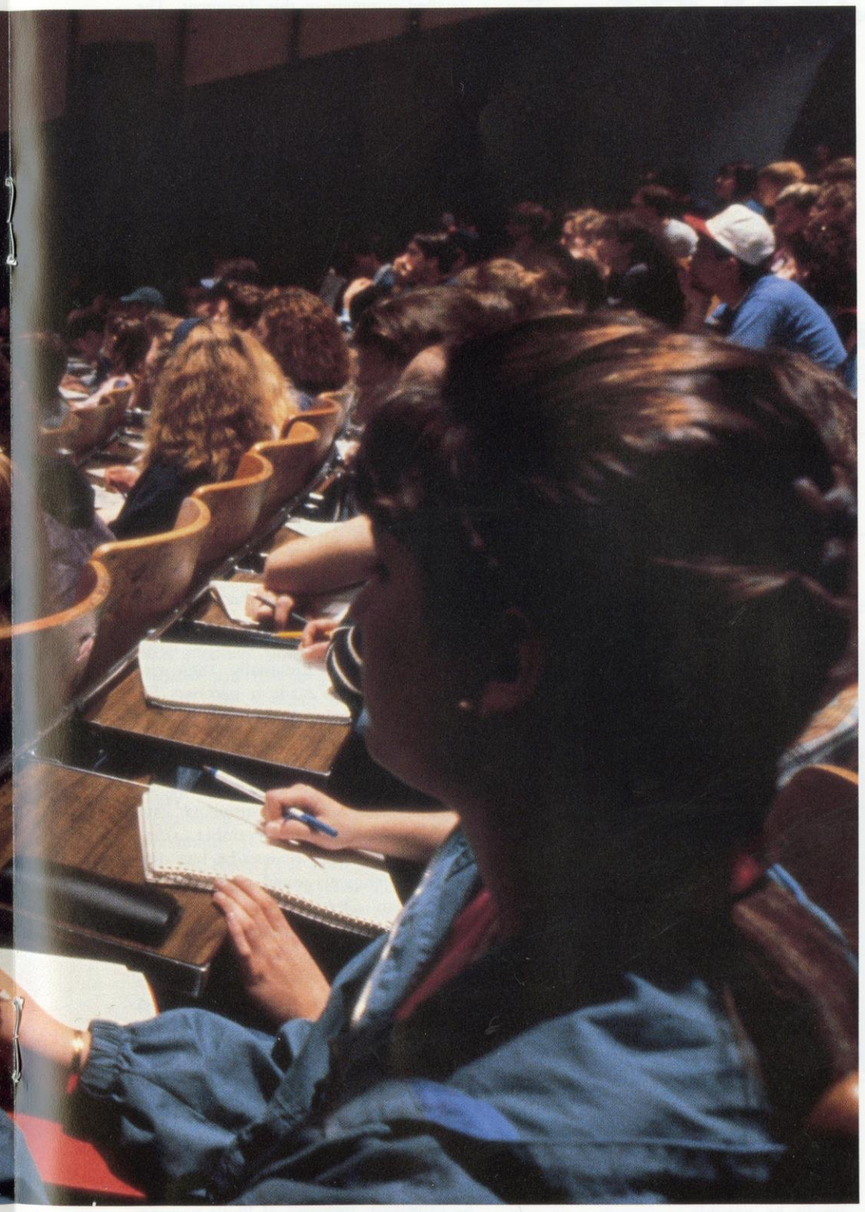


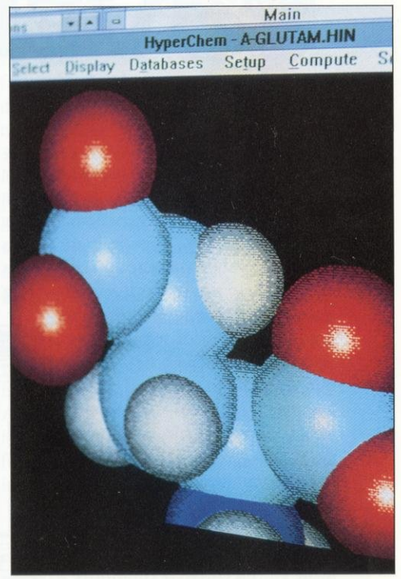
John D. Ferry

THE portraits of UW Madison Chemistry faculty members W. W. Daniells, J. Howard Mathews, and Farrington Daniels are on the walls of the Chairman's office. In September, I approached Barbara Ferry with the idea of obtaining a portrait of John Ferry to add to the department collection, and hoping to enlist her help in finding an artist. John, who was chair of the department when I started my faculty career at Wisconsin in 1963, was to me an many others in the department the last of a generation of great leaders who created the foundation of excellence on which the department now stands. He is an eminent scholar and teacher, and even now as an Emeritus Professor he is continuing his research efforts. We were extremely fortunate to secure Ben McCready for the portrait which is shown above. The portrait was painted during the period of September through November, with the setting being in John's home on Prospect Avenue. A formal dedication and presentation will be held early in the 1994, and from that point, the portrait will hang in the departmental office.

Ben McCready has earned international acclaim throughout the past decade for his portraits of distinguished statesmen, business leaders, educators, and prominent members of the arts, entertainment, scientific, and financial communities. Critics, collectors, and connoisseurs from around the world have called him the finest portrait painter of his generation and one of the leading portrait painters of the twentieth century. He is the only artist ever to be asked by four presidents of the United States to paint their official portraits. His work is part of more than four-hundred collections, both public and private, in over 15 countries. His portraits are part of the permanent and touring collections of several of America's most renowned museums. ■







WITH a projection system hooked up to a computer, it is now possible to project computer images in lecture. The accompanying photographs of John Moore's Chemistrty 104 class in Room 1351 display some of this technology in action.

In use is an IBM PS/2 Model 75 computer with the Autodeck Hyperchem molecular modeling program and an Electrohome Video Projector. It is also possible to draw this as a ball and stick model, display only the carbon backbone, and rotate the molecule in three dimensions, adding significantly to the visualization of molecular structure. Some of our readers may already have seen these photos, which appeared in the September/October edition of the alumni magazine, "On Wisconsin."

THE OVERVIEW

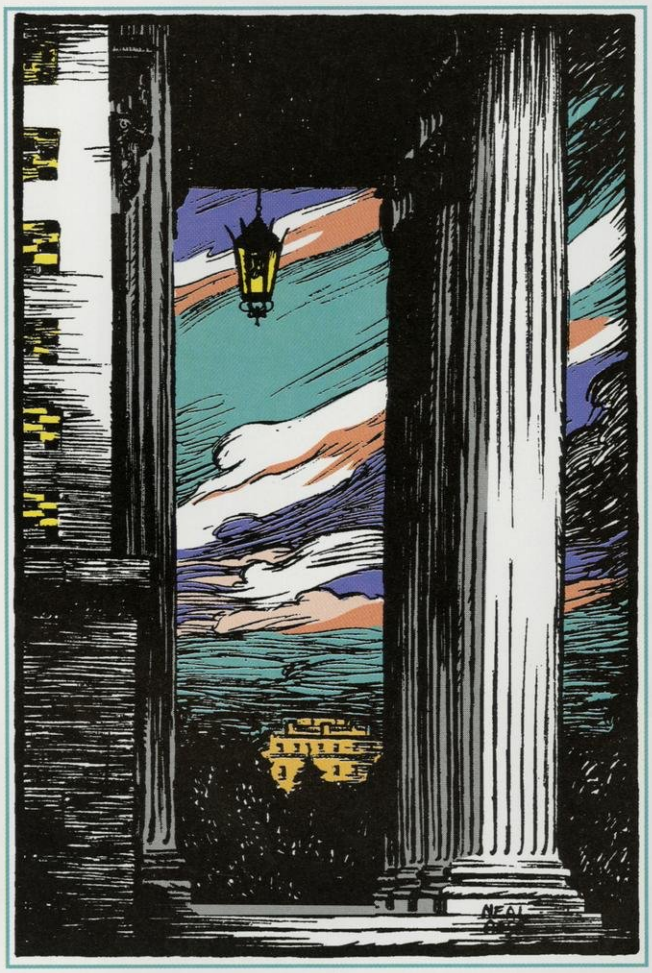
Post-tenure Review

Against strong faculty opposition, the UW Regents decided to require the university to institute a periodic review of tenured faculty. This decision reflects increasing public pressure on universities and parallels similar requirements being instituted at campuses across the country. A series of recommendations was developed by a Planning Committee: tenured faculty members of each department would develop their own procedures and criteria; a departmental review committee would carry out the reviews; procedures will include discussions with the faculty member, a report to the department's executive committee, recommendations on actions if needed, and a report to the appropriate college Dean; and reviews would be on a five year cycle and be based on teaching, research, outreach and service.

During the fall, the department's Finance Committee deliberated on this issue, eventually recommending to the department that a five person committee carry out reviews. This includes the department chair plus a representative of each division with a staggered two year rotation. Faculty to be reviewed could volunteer or would be selected at random, within constraints of the need to review each person every five years. The Committee will examine accomplishments during the past five years, meet with the faculty member, and prepare the report. As this is being written, we are selecting candidates for the first round of reviews.

Strategic Planning

At the end of 1992, Chemistry had carried out an extensive a Self Study mandated by the College. While useful in any context, this study had been carried out with a specific intention—it was intended as the department's initial input into College plans to balance the budget. During the early part of 1993, self study documents from L & S departments were reviewed by ad hoc faculty committees in Natural Sciences, Humanities, and Social Sciences. Each committee was given a specific target to identify 15 faculty cuts. The Natural Sciences committee treated Chemistry well, suggesting that cutting one faculty member would be possible.



The three committee reports became the basis for further study by the L & S Academic Planning Council, a faculty advisory committee to the Dean of the College. The Strategic Plan for 1993-8 was created and distributed in late June.

Space limitations do not permit a detailed summary of this document. The College's strategic plan was developed with deliberate care based on two possible scenarios, Plan A and a "more stringent" Plan B. Attention was immediately directed to the bottom line. Plan A called for a cut of 75 faculty positions. Three cuts were required in Chemistry over the next five years; if implemented, Plan B would require a fourth cut.

It might be pointed out that spring, 1993 was also stressful time for the College. The financial situation that came into focus as the fiscal year ended was much bleaker than earlier projections. Besides the need to identify funds for Quality Reinvestment (the exercise initiating this sequence of activities) an additional several million dollar operating deficit was encountered. As usual, there were a collection of reasons, but important on this list was the fact that fewer faculty had gone on leave and a remarkably small number of faculty chose to retire in 1992-3. Eventually, these circumstances made it necessary for the College to carry over a large deficit into the 1993-4 fiscal year.

The second step of the Strategic Planning exercise called for responses from departments. Due at the end of December, these report were to describe how the departments would implement the plan. Over the fall, Chemistry's Long Range Planning Committee and Finance Committee deliberated on alternatives. The conclusion was to propose that Dean Phil Certain's position be included as the first cut, and that Dan Cornwell not be replaced when he retired at the end of the 1994-5 academic year. A third position was promised for later in the five year window, but with no other retirements a specific position could not be identified. Inclusion of Phil's position seemed logical; it was assumed that he would not contribute in either teaching or research during the next five years. This was offered with the understanding that we would come up with a further cut if he returned to the department.

Earlier, in its self study, the department had identified support staff and infrastructure as its highest priorities. It was felt that the department could not afford cuts in staff to meet the college mandate.

In addition to naming the faculty cuts, the department concluded that fewer faculty would also have to result in fewer courses offered. Deletion of a spring Chemistry 103 section and a fall section of Chemistry 221 was proposed; the students displaced could be accommodated in other sections of these courses, albeit with an increase in the student/faculty ratio. Also targeted were four graduate courses, formerly offered every year, now to be offered in alternate years.

As this is being written we are waiting to learn whether the College will accept our implementation plans.

In responding to the College's plan, the department was given the opportunity to offer further information on its current situation. Among the most striking information: ...Seventy percent of the department's teaching assignments are in undergraduate courses; 20% are in core graduate and 10% in advanced graduate courses. This summary does not include research and seminar courses. ...90% of the undergraduates taught in the department are in general chemistry and organic chemistry; these are generally regarded as courses for freshmen and sophomores. ...The enrollment in undergraduate courses has been rising steadily for four years and is now 25% higher than it was in 1990. This contradicted information provided by the college on declining chemistry enrollments, and was also counter to the trend in college enrollment overall.

Curriculum Reform

Toward the middle of 1993, NSF announced that it would create several national centers to develop and implement major chemistry curriculum reform. The carrot offered was the possibility of major NSF funding, perhaps as much as $1,000,000 a year for five years.

In many ways, Wisconsin seemed an ideal site for such an effort. The department's strong commitment to undergraduate teaching is evident on campus, and its teaching excellence is seen in recent teaching awards of its faculty. The department has a significant presence in Chemical Education because of ICE and Seraphim.

The first step was a proposal to NSF for a planning grant. Professors Landis, Moore, Treichel, and Wright became a self declared steering committee for this project. The proposal, submitted in October, was chosen for funding, one of the 14 proposals out of 112 that were submitted to NSF that were successful. The planning grant will enable the department to hold three planning conferences during the current year. The first conference went off on schedule in mid-November with 100 persons in attendence (one day after we learned about the funding.)

Our general approach in this project will be to focus on two aspects of the curriculum—content and pedagogy, what we teach and how it is taught. The former proposes to develop a two year "topic oriented" approach that integrates the various areas of chemistry and incorporates a major interdisciplinary flavor. In the latter, the hope is to use established techniques of active or cooperative learning. The development of new materials—for instance, new computer assisted learning tools and new laboratory experiments —will be required for both aspects of this project. With Seraphim and ICE we already have a wealth of experience in this area.

At this writing the committee of four had become a committee of six with the addition of Steve Burke and Denise Denton (who has a joint appointment in Computer and Electrical Engineering and Chemistry.) Many other UW Madison faculty are participating in conferences and in planning. If we are successful in getting funding, we expect to work with other UW campuses and several liberal arts colleges.

Other News

...US News and World Report in its March 22 issue ranked Graduate Science Programs. UW-Madison was among the top 12 Graduate Schools; among Chemistry Departments, we were given 10th ranking.

...Seventeen university faculty members, including five Chemistry faculty members, received equipment from IBM's Shared University Research Grant of $1,300,000. From proposals written to this program, Professors Weisshaar, Crim, Sibert, and Weinhold jointly received two IBM RS 6000 computers, a model 580 and a model 370. The 580 is now the fastest and biggest computer in the department, with 512 megabytes of memory. Bob Hamers got another Model 370, with top-of-the-line graphics capabilities. These computers have been incorporated into the department's computer network. Shortly, they will also be networked with the other new campus IBM computers provided by the IBM grant, using IBM's new Condor Software.

...The plan for a UW Teaching Academy, developed by a committee headed by Jim Taylor, was approved unanimously by the Faculty Senate in December. About 30 fellows will be selected annually. The academy is envisioned as a forum for discussions and debates about teaching methods and issues.

...Teaching workloads were a subject of considerable attention in the local news media. The Legislative Audit Bureau reported that UW Madison faculty were teaching less, with formal classroom instruction for undergraduates down from 4.9 hours per week in 1981 to 4.1 hours per week in 1991. On campus, there was sharp criticism of this report which failed to include graduate teaching and individual instruction at all levels. In response the report and other pressures, UW System President Lyall called on all UW institutions to develop a "written faculty workload policy" that would define a "normal" teaching load.

...The UW established a new program to stimulate innovative uses of technology. Twenty-five $30,000 awards will be made in the next five years using gift and endowment funds. The Department of Information Technology (DoIT) was assigned to run the program. Unfortunately, the Chemistry Department was not successful in the first competition, held during the fall, to select five awardees from about 50 proposals. A new competition for 1994 is underway.

...Even as the university was succeeding in its plans to downsize, it has anticipated enrollment increases in the late nineties. A committee has been reviewing EM-3 (Enrollment Management III) the third stage of enrollment management on campus. Available data project increases in enrollment of about 20% over the decade beginning in 1995.

NEW BADGER CHEMISTS

PHD

MAY, 1993

BURLEIGH, DARIN C. (SIBERT) "Theoretical Investigations of Rotation-Vibration Interaction in Formaldehyde."

CAVALIERI, JEFFERSON D. (WEST/MOORE) "A Study of Si-29 Chemical Shift Anisotropy in Disilenes and Cyclic Organosilicon Compounds, and General Chemistry Instruction By Computer: Tutorial Modules for the KC? Discoverer Program."

GALLO, ELIZABETH A. (GELLMAN) "Conformation-Directing Effects of Intramolecular Hydrogen Bond Formation."

IVANECKY, JOSEPH E. (WRIGHT) "Higher Order Effects in Nonlinear Raman Scattering."

KIM, SANGHOON (YU) "Lateral Diffusion of Surface-Active Molecules at the Air/Water Interface."

LUCKEY, JOHN A. (SMITH) High-Speed DNA Sequencing by Capillary Gel Electrophoresis."

SUH, WON CHUL (RECORD) "The Interaction of *E. coli* RNA Polymers with Lambda Phage P^R Promoter: Evidence for Two Open Complexes and a Requirement for Mg^{2+} to Open the Transcription Start Site."

TONG, XINCHUN (SMITH) "A Solid-Phase Method for the Purification of DNA."

WANG, YAN (CASEY) "Synthesis, Reactions and Mechanistic Studies of Rhenium-Platinum Complexes."

ZHANG, ZHONGJU (ELLIS) "Studies of Adsorbate Effects on the Photoluminescence of Cadmium Sulfide and Cadmium Selenide."

AUGUST, 1993

BAUMANN, MELISSA G. (ELLIS) "Spectroscopic and Structural Properties of Molecular Solid Solutions Between Photoluminescent Quadruply-Bonded Molybdenum and Tungsten Compounds."

DESPER, JOHN H. (GELLMAN) "Structural and Metal-binding Studies of Preorganized Polythioethers."

KOTT, KEVIN L. (MCMAHON) "Second-Order Nonlinear Optical Properties of Organic Molecules."

LU, KUEIH-TZU (WEISSHAAR) "Internal Rotation in Toluene and Phenylsilane Cations."

MATULENKO, MARK A. (BURKE) "Progress Toward the Total Synthesis of (+)-Breynogenin."

MCELLISTREM, MARCUS T. (HAMERS) "Tip-Related Current and Electric Field Effects in Scanning Tunneling Microscopy."

NEU, DONALD R. (ELLIS) Photoluminescence as a Probe of the Interaction of Gaseous CVD Precursors with Semiconductor Surfaces."

TRUDEAU, JON D. (FARRAR) "The Use of Ab Initio Calculation and NMR Relaxation Time Experiments to Obtain Molecular Structure and Dynamic Information of Systems in Solution."

WHOOLERY, ALISON (DAHL) "Synthesis and Physicochemical Characterization of Large Nickel-Carbonyl-Arsinidene Clusters and A Novel Au_6Ni_{12} Carbonyl Cluster."

DECEMBER 1993

BARNHART, TERENCE M. (MCMAHON) "The Structural Observation and Thermal Reactivity of Intermediates in The Catalytic Isomerization of Alkenes."

BARRETT, DAVID G. (GELLMAN) "1,6-Methane[1C]annulene-derived Contrafacial Amphiphites and Metophiles: Synthesis and Initial Studies of Solution Properties."

COCHRAN, JOHN E. (WHITLOCK) "The Efficient Synthesis of Tribridged Naphthalenophanes and Their Complexation of Phenols, Amides, Phosphoramidates, and Sulfonamides in Nonaqueous Media."

DADO, GREGORY P. (GELLMAN) "Structure-Directing Effects of Non-Covalent Interactions in Oligoamides and Peptides."

DEAL, KIM ANNE (BURSTYN) "The Mechanism of Macrocylic Copper(II) Catalyzed Phosphate Diester Hydrolysis."

DEPINTO, JEFFREY T. (MCMAHON) "Isomerism in Acetylenic Carbenes."

DYKSTRA, ROBERT R. (REICH) "Characterization of Lithium Ion Pair Structures in Solution. Effects of Ion Pair Separation on the Configurational Stability and Geometry of Sulfur- and Silicon-Stabilized Organolithium Reagents."

FRITZ, MARK D. (CRIM) "The Characterization of Highly Excited Rovibration States: Two-Dimensional IR-UV Double Resonance and Photoacoustic Spectroscopy of Acetylene and Formaldehyde."

HAJDUK, PHILIP J. (LERNER) "Relaxation and Dynamics in NMR Spectroscopy: Applications to Biomolecules."

HAYASHI, RANDY K. (DAHL) "The Crystallographic Characterization of Platinum Carbonyl Cluster Anions."

HIGGINS, DANIEL A. (CORN) "Optical Second Harmonic Generation as a Probe of Molecular Adsorption and Orientation in Monolayer Films at Condensed-phase Interfaces."

KIM, THOMAS D. (BURSTYN) "Identification and Characterization of an Endogenous Inhibitor of Soluble Guanylyl Cyclase from Bovine Lung."

O'BRIEN, MICHAEL (ZIMMERMAN) "The Photochemistry of Various Organic Molecules in a Poly (Methyl Methacrylate) Matrix."

OLIVER, PATRICIA A. (VEDEJS) "The Effects of Allylic Substituents on Osmylation and Epoxidation Facial Selectivities."

PETROVICH, LORI M. (CASEY) "Selectivity in Rhodium-Catalyzed Hydroformylation is Kinetically Controlled and Determined by Diphosphine Chelation Mode."

SAVAGE, PAUL B. (GELLMAN) "Preparation and Characterization of Phosphine Oxide- and Sulfoxide-Based Receptors for Ions and Monosaccharides."

SHIBLEY, JOHN L. (WEST) "Studies of Silicon-Nitrogen Ring Formation from 1,1,2,2-Tetrachlorodisilanes."

SIMONS, JOHN K. (TAYLOR) "Synchrotron Radiation Studies of Hydrocarbon Treated Si Surfaces and Diamond Nucleation."

WANG, YICHUN (NELSEN) "Sesquibicyclic Hydrazines and Their Radical Cation and Dication Oxidiation Products."

WOLTMAN, GARY R. (SCHRAG) "An Exploration of the Potential of the OFB Analysis Technique to Obtain Characterization Information on Polydisperse Branched Homopolymers."

YU, ANITA (BURSTYN) "Spectroscopic Studies on the Mechanism of Activation of Soluble Guanylyl Cyclase by Nitric Oxide."

MS

COUSINS, BRIAN (HAMERS)
LITTLE, JENNIFER C. (GELLMAN)
LONGO, RACHEL (BURKE)

BS

AHERN, CHRISTOPHER A.
ALLEN, AMY E.
BAGHERI, SHAHROKH
BATCHELOR, JEFFREY M.
BAUM, CHRISTOPHER C.
BLUM, KARLEEN F.
BRODRICK, PETER S.
BROWN, STEVE E.
CIMBALNIK, KELLY A.
ECKERT, TIMOTHY E.
GISWOLD, MARY E.
GOOSSEN, MARK D.
GUNATILAKA, DINESH M.
HALLER, BRAD W.
HAUG, KERSTIN L.
JACOBSON, DAVID C.
KLEBS, PAUL J.
KOWAHL, VAUGHN C.
LENNON, ROBERT P.
LUBAHN, CHERI L.
MANLEY, KOREY L.
MATYSIC, BETH E.
MENDUM, THOMAS H.
MOHR, LAURENCE D.
MOORE, KRISTA M.
OLSEN, CARL E.
OLSON, JOEL A.
OTHMAN, MUZZAFFAR
ROBINSON, JAMES A.
SCHNEIDER, PAUL R.
SHEPARD, GREGORY L.
WAN MOHAMAD, WAN S.
WONG, NANCY S.

JIM TAYLOR AWARDED BASCOM PROFESSORSHIP

The department was very pleased to learn last May that Jim Taylor had been awarded a John Bascom Professorship. Jim's record here seemed a perfect fit to criteria for this all-University award. Bascom Professorship winners are chosen for broad excellence; in addition to outstanding research, both teaching and service to the University are prominent criteria. The award is sponsored by the Wisconsin Alumni Foundation.

Because of the award, this seemed like a good time to report on James Taylor's activities, since they have grown significantly in scope over the past decade. In recent years, Jim held five significant administrative positions, two of which are still current commitments.

►He was Chair of the Materials Science Program from 1986-90. This is a interdisciplinary program involving over 20 faculty from a number of departments in the Colleges of Engineering and L&S.

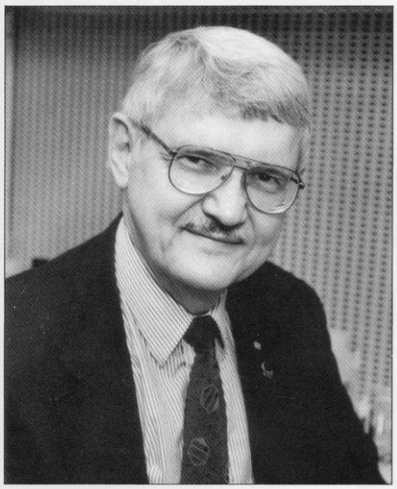
►In 1990, he became the Chair of the University Committee. Although other chemists have been members of the committee in the past, Jim was the first member of our department to serve as chair. This important group, elected by faculty vote, acts as the Executive committee for the Faculty Senate.

►From 1990-91 Jim served as the Director of the Synchrotron Radiation Center, the major electron storage ring located in Stoughton, 13 miles from campus and one of six such major facilities in this country. The SRC is funded at a level of $3.5 million per year as a national resource for the study of materials using the vacuum ultraviolet and X-ray radiation produced by the storage ring, to produce the next generation of microcircuit devices.

►Since 1988, he has been the Associate Director of the Center for X-Ray Lithography; this effort is discussed in more detail below.

►In 1991, Jim took over the Chairmanship of the Department's Analytical Sciences Division, a position that he had held earlier.

At the Center for X-ray Lithography (CXrL), Jim and two colleagues from Engineering, Franco Cerrina of Electrical and Computer Engineering (the Director of the Center) and Roxann Engelstad of Mechanical Engineering, have produced a very unusual and interesting collaboration for a research university. They have created a miniature semiconductor fabrication facility where microcircuits can be designed, built and tested. The key to the whole process is the use of the X-rays to print images in photoresist materials. X-radiation avoids the diffraction effects created by the use of UV and visible light. X-rays also allow this work to be done at very small dimensions equivalent to what will be needed in the semiconductor industry in the near future. The research program and the facilities assembled for this daunting task is funded by the Department of Defense through the Advanced Research Projects Agency (ARPA), the Office of Naval Research, the National Science Foundation, the Semiconductor Research Corporation (SEMATECH), and IBM and Motorola Corporations. The substantial funding levels for this effort was just recently enhanced by a gift from National Semiconductor of an electron-beam writing machine that cost approximately $4.5 million when new four years ago. According to the Graduate School listing, this facility has received the top ranking of funding for research on this campus.

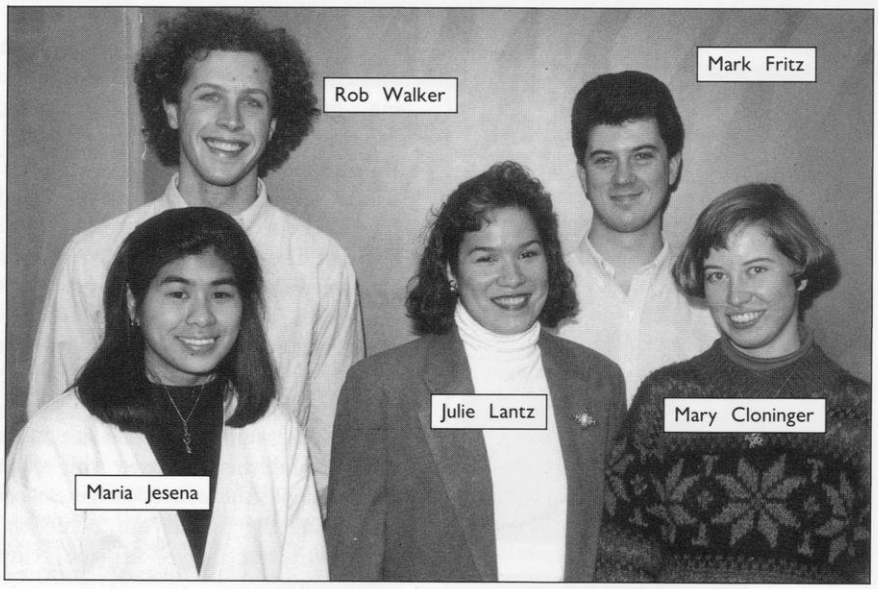


Jim Taylor

In the United States there is only one other facility that can accomplish what CXrL can for the semiconductor industry; that is the $500 million facility created by IBM in East Fishkill, NY. At that facility, IBM is studying the manufacturing problems associated with X-ray lithography, complementing work at Wisconsin where research is directed into the questions of how to push the state-of-the-art to smaller and smaller devices. The research problems in this area are those of chemical materials: their properties, their responses to radiation, their kinetics of reactions, and their stability, optical problems such as how to deliver the X-rays at the correct intensity and uniformity, and mechanical stability problems associated with making a stencil hold the correct images so printing from the stencil can occur on a wafer in one stage of the circuit construction.

Jim currently has a research group of seven graduate students located in the department, but there is a staff of approximately 25 connected with CXrL's National Test Bed for X-ray Lithography. The "national" emphasis is intentional because of the international competition in the semiconductor industry. Japan, for example, has a number of electron storage rings which can be used for lithography and are building more. The U.S. has two, at IBM and Wisconsin.

A final aspect of Jim's recent contributions to the University is his work on an all-University committee considering the status of teaching at a major research university such as Madison. He was chair of the "Teaching Quality, Evaluation, and Rewards Committee" that investigated the situation on Madison campus. Although the committee was impressed with the overall quality of the teaching and dedication of the Madison faculty, there were clear signs here, as elsewhere, that quality teaching was not valued and rewarded sufficiently. The Taylor Committee recommended to the Faculty Senate a number of changes that would improve the reward structure, initiate some major discussions in evaluation, and in general, improve the climate for teaching on campus. One recommendation was for the creation of a Teaching Academy to acknowledge the innovative teachers on campus and to provide a forum for discussion of the new ideas of student learning.



GRADUATE STUDENT AWARDS

Dan Higgins (BS '88, St. Olaf College; Ph.D. '93, Corn) won a Sigma Xi award for outstanding Ph.D. research; this was one of four awards on campus. After finishing his Ph.D. in summer, 1993, Dan took up a postdoc appointment at the U. of Minnesota.

Michael Fitzgerald (BS '89, Davidson College; Smith) received the Charles N. Reilly-Upjohn Award; this annual award recognizes an outstanding graduate student in analytical chemistry.

Marc Cicerone (BS '89, BYU; Ediger) was awarded an IBM Polymer Science and Technology Fellowship.

Departmental industrial fellowships during 1993-4 were awarded to: Yariv Donde (BS '91, Cal State-Fullerton; Vedejs, Eastman Kodak Fellowship); Peter Ellingson (BS '89, UW-LaCrosse; Yu, Grace Fellowship); James A. Morrison (BS '89, Purdue; Burke, Lubrizol Fellowship); Robert Walker (BS '90, Dartmouth College; Weisshaar, P & G Fellowship);

A series of awards for outstanding graduate students was initiated with funding from the Hoechst Celanese Corporation. These $500 awards were presented at an award ceremony during the fall. At the presentation, given in the format of a research colloquium, the recipients were introduced by their major professors and then gave short presentations on their research to the department.

This is the second department-wide colloquium program to be established in two years, the first being the Upjohn Faculty Teaching Award Symposium

1993 Hoechst Graduate Student Award winners, with background information and the title of their talk: Peter C. Ellingson (BS '89, UW-LaCrosse; Yu), "Some Aspects of Polymer Interfacial Behavior" Brian L. Frey (BS '91, Ripon College; Corn), "Surface Plasmon Studies of Self-Assembled Thin Films on Gold Surfaces" David A. Horita (BS '88, Carleton College; Lerner) "Dynamic Studies of Molecules by NMR" Robert W. McGaff (BS '89, UW-Eau Claire; Gaines) " Synthetic and Mechanistic Investigations of New Aminopentaboranes" Yichun Wang (BS '82, Fudan U. China; Ph.D. '93, Nelsen) "Bond Weakening in Hydrazine Oxidation Intermediates."

The UW initiated a program of "Teaching Assistant Mentor Awards," honoring outstanding TAs. Five Chemistry TAs were honored with cash awards at a reception in January: Mary Cloninger (BS '91, TCU; Whitlock), Mark Fritz (BS '88, Wabash College; Ph.D. '93, Crim), Maria Jesena (BS '89, U. Michigan; Schrag), Julie Lantz (BS '88, Loyola U.; Corn), Rob Walker (BS '90, Dartmouth College; Weisshaar).

AWARDS ★ AWARDS

In April, **Chuck Casey** received one of the highest honors in the U.S., election to the National Academy of Sciences. Soon thereafter, he was notified that he had also been elected Fellow of the American Academy of Arts and Sciences.

Fleming Crim received a Max Planck Society Research Award in conjunction with Professor Jurgen Troe at Gottingen. This award provides $100,000 DM for research collaboration and travel.

Emeritus Professor **Chuck Curtiss** has been named as the 1994 Eringen Medal winner of the Society of Engineering Science; he will receive the award at the Society's annual meeting at Texas A & M.

Sam Gellman received an Alfred P. Sloan Research Fellowship. Sloan Fellowships identify outstanding young scientists and provide an unrestricted research grant. Sam was one of 90 scientists selected for Sloan awards from over 400 nominees.

Bob Hamers received the 1993 Peter Mark Award of the American Vacuum Society, at the Society's meeting in November at Orlando, FL. His citation reads, "For outstanding contributions to the development of scanning tunneling microscopy and spectroscopy as tools for quantitative analysis of the electronic properties of surfaces."

Laura Kiessling won a 1993 Young Investigator Award. This is the new name of the former PYI program at NSF. This award provides five year of research support for her project, "Studies on Oligosaccharide-Protein Interactions."

Cathy Middlecamp, Director of the Chemistry Learning Center, received the 1993 Norman Bassett Award for outstanding achievement in student services. She was the first department member to receive this award, and one of the few in an academic department to be so honored. The Norman Bassett Award was established in 1983 by the UW-Madison Student Personnel Association. Part of the award text reads "...Cathy Middlecamp has established a record of excellence in student services over a long period of time, and has produced innova-

AWARDS ★ AWARD

tive programs and materials that successfully meet student needs.... She has built a staff at the Learning Center that is sensitive to the cultural differences and learning styles of a diverse student population."

Upjohn Faculty Teaching Awards: The second annual Upjohn Awards for Faculty teaching went to **John Moore** and **Gil Nathanson**. At the Upjohn Teaching Award Ceremony in fall, John talked about his work in computer assisted instruction, in a talk entitled "Teaching a Dynamic Subject Dynamically." Gil presented a summary of activities involving student research project in Chemistry 116, the recently developed honors course for freshman.

Jim Skinner received one of the three Guggenheim Awards given to faculty at Madison for 1993. His Guggenheim supported research will focus on understanding the properties of disordered materials. Jim also received a Humboldt Senior Scientist Award. Using these awards, he will spend part of the spring semester, 1994 and summer 1994 in Bayreuth, Germany.

Jim Weisshaar is the most recent member of the chemistry faculty to receive a university teaching award. This is a particular honor; from 2,500 current faculty, ten awards are made annually. Chemists have figured prominently; since the inception of these awards in the late 50's nine members of the chemistry faculty (six current faculty members) have been so honored.

Hyuk Yu was named to receive the American Physical Society's High Polymer Physics Prize for 1994. This award, sponsored by Ford, was for Hyuk's "... outstanding application of optical techniques to the determination of polymer conformation and motion."

The Student Affiliates Chapter of the Wisconsin Section of the ACS received an award for Innovative Activities in the form of a grant to fund the project "Career Day: Opportunities in the Chemical Sciences." Lynn Hunsberger and John Moore are mentors for the ACS SA chapter.

John D. Ferry (cont.)

paints for marine applications; at Harvard he was attached to the E. J. Cohn Project which had as its overall objective the large scale fractionation of human blood plasma to obtain the serum albumin and other plasma proteins for clinical use by the U.S. Armed Forces. This work instigated a career-long interest in fibrinogen to various useful forms; the group produced two particularly useful materials, a fibrin foam and a fibrin film. The film, the product of a collaboration between John and Dr. Peter Morrison, was developed to the point where it became the first safe and effective surgical replacement for the dural membrane which lines the brain. John and Peter also succeeded in producing interesting plastics by heating fibrinogen with glycerol; these were not further developed in this country, but later were used for surgical replacements in Hungary.

In 1946 John joined the faculty of the Department of Chemistry of the University of Wisconsin as an assistant professor; by 1947 he had been promoted to full professor. He served as department chairman from 1959 to 1967, and was appointed Farrington Daniels Research Professor in 1973.

John Ferry is undoubtedly the most widely recognized research pioneer in the studies of motions and motional dynamics in macromolecular systems by means of viscoelasticity. From the beginning of his career he realized that the unique physical properties of polymeric materials are intimately linked to the motions and configurations available to large, flexible macromolecules. He has made an extensive and concentrated effort to determine experimentally the relation between chemical structure and viscoelastic properties of well characterized samples. His fundamental studies of rubbers, polymer melts, and polymer solutions have provided the mechanical properties' foundations for polymer scientists in both academia and industry. His book, "Viscoelastic Properties of Polymers," first appeared in 1961 and rapidly became the bible of mechanical properties of polymers. The book generated sufficient demand worldwide to be translated into three languages; Japanese, Russian, and Polish. A second edition appeared in 1970 and a third edition appeared in 1980. A list of more than 285 publications dealing with macromolecules attests to his interest in, and extensive contributions to, polymer science.

His work with synthetic molecules has covered the entire concentration regime from undiluted polymer melts and rubbers, for which intermolecular interactions and "entanglements" are important, to infinite-dilution properties for which rigorous statistical mechanical theories are available. Interestingly, experimental studies of chain dynamics, particularly viscoelasticity data, have generally substantially preceded theoretical understanding, due largely to the investigations of John Ferry and his collaborators.

Throughout his career John has received many national and international awards, including membership in the National Academy of Sciences; the Eli Lilly Award, the Colloid Chemistry Award, and the Witco Award in Polymer Chemistry of the American Chemical Society; the Bingham Medal of the Society of Rheology; the High Polymer Physics Prize of the American Physical Society; the Colwyn Medal of the Institute of Synthetic Rubber Producers. He has aided the scientific community in various capacities including serving as Chairman of the Committee on Macromolecular Chemistry of the National Research Council, President of the Society of Rheology, Chairman of the International Committee on Rheology, joint editor for the distinguished series Advances in Polymer Science, and editorial board member for five journals. He has supervised 57 graduate students, and has had 32 postdoctoral and foreign associates from seventeen different countries working in his laboratories at Wisconsin.

We extend our contratulations to the 1993 UW Badger Football Team—

Rose Bowl Champs!

Social Interactions in Chemistry Groups

Bruce Wampold, Professor of Counseling Psychology at the UW-Madison, received a BS in mathematics from the U. of Washington, M.Ed. in Educational Psychology from the U. of Hawaii, and Ph.D. degree in Counseling Psychology from the U. of California at Santa Barbara. His research interests are in the area of social interactions. He has developed statistical methods for examining patterns of behavior in social interactions and has used these methods to investigate marital interactions, psychotherapy sessions, mother/child interactions, and classroom interactions. He has published two books, several book chapters, and over 50 journal articles in his areas of interest. He is a Fellow of the American Psychological Association and Associate Editor of the Journal of Counseling Psychology.

AS A PSYCHOLOGIST who has studied social interactions in many contexts (e.g., distressed marital couples, psychotherapist/client dyads, teacher/child interactions in the classroom) and who is interested in the personal aspects of science, I was curious to investigate how scientists manage their social interactions and how scientists perceive the importance of these social interactions. I suspected that the lay stereotype of the scientist as social isolate was inappropriate and that the social interactions within scientific work groups were rather intensive and important to the group members.

A friend, Sandra Greer, past Chair of Chemistry at Maryland, suggested that the Department of Chemistry at the UW-Madison would be the place to investigate interpersonal interactions in science environments. The UW Chemistry Department has national prominence and, in her opinion, would have an interest in and openness to this type of investigation. Happily, she was correct. Chairman Paul Treichel expressed interest and suggested that I contact Professors Fleming Crim and Robert West. Drs. Crim and West were willing to approach their research groups with the idea and, after I explained the project, both groups willingly (and I should say eagerly) agreed to participate in a pilot project.

Identification of factors that lead to

career satisfaction is a primary focus of vocational psychology. Vocational psychology theory predicts, and hundreds of studies have confirmed, that people seek environments that are compatible with their abilities and contain tasks that are interesting and allow them to express their attitudes and values. Although many person-environment fit models have been developed, Holland's theory, which postulates six personality types (Realistic [R], Investigative [I], Artistic [A], Social [S], Enterprising [E], and Conventional [C]) and six environments (with the same descriptors R, I, A, S, E, and C), has been the focus of extensive research.

According to Holland, the relationships among the six personality types can be represented as a circumplex:

R I
C A
E S

The Euclidean distance between the types corresponds to their psychological similarity (e.g., Investigative types are most similar to Realistic and Artistic types and least similar to Enterprising types). Chemists who have been in the field five or more years and report that they are satisfied with their current work typically are classified as Investigative and secondarily as Realistic. Investigative people are described as analytical, complex, curious, intellectual, introspective, and rational; Realistic people are described as mechanical, practical, conforming, genuine, and asocial. Generally, Investigative and Realistic people prefer working with tasks rather than with people. On the other hand, Social types are described as cooperative, friendly, empathic, sociable, understanding, and warm. They prefer working with people rather than with tasks.

Holland's theory indicates that chemists derive satisfaction from working on tasks related to solving complex problems connected to atomic and molecular structures and reactions; interacting with others is relatively less important. Moreover, the theory postulates that Investigate types would possess relatively fewer social skills (particularly compared to social types) and would not derive satisfaction from social interactions. I suspected that Holland's theory does not recognize that social interactions are important to scientists and that much of their scientific work is conducted within a social context. Surprisingly, there have been few attempts to investigate the interpersonal interactions of scientists in their work settings. With these considerations in mind and my interests in social interactions, I have begun a series of studies, including this pilot study of chemistry groups, to examine how various types of people (including scientists) structure their interpersonal interactions in the work place.

The pilot project was designed to gather preliminary data related to the nature, density, and importance of social interactions in chemistry work groups. The project involved administering three paper and pencil inventories, interviewing group members, and observing interactions in group meetings and in various lab settings. The three inventories administered are described as follows:

Strong Interest Inventory (SII) measures vocational interests and produces a profile based on the six Holland types (i.e., categorizes respondents into one of the six types). The SII frequently is used in career counseling to assess vocational interests so that clients can be matched with compatible work environments. (Each of the group members received a copy of the results of the SII.)

Self-Description Inventory (SDI) is a self report measure of the types of social interactions with which the respondents feel comfortable. Relative interest in six areas is assessed: emotional expressivity, emotional sensitivity, emotional control, social expressivity, social sensitivity, and social control.

Social Support Inventory (SSI) is a measure of the need for social support in various areas of one's life.

In many respects, the results were con-

gruent to expectations, but in other respects they raised interesting and intriguing questions. Following is a summary of the results of the inventories, interviews, and my observations of the interactions:

As expected, the primary Holland classification (derived from the SII) of the members of the research groups was Investigative. The secondary classification for many was Realistic, although for some it was Social, Artistic, or Conventional.

Generally, the expressed need for support in their life from others (as reported in the SSI) was varied and similar to the general population (i.e., some expressed below average need for social support and some expressed above average need).

With regard to relative interest in various facets of social interactions, the members expressed (on the SSI) below average scores in the areas of emotional expressivity (communicating using nonverbal means, especially sending emotional messages), emotional sensitivity (noticing and interpreting others' emotional states as indicated by nonverbal gestures), and social expressivity (verbal expression, particularly engaging others in social discourse).

Contrary to the commonly held conception of scientists primarily focusing on tasks while ignoring social interactions, the density of the social interactions in the research groups was high. Time was spent discussing substantive scientific issues (i.e., conversation focused on a chemistry problem), equipment and other procedural topics, and purely social topics (e.g., favorite restaurants, sports, arranging social activities). Moreover, group members indicated that these social interactions were an important part of their professional development (i.e., improved the quality of their science) and of their personal satisfaction with their scientific work. Conflictual situations attenuated their ability to complete tasks and decreased enjoyment of their work. Finally, many of the graduate students indicated that they chose their current group to a large extent because they anticipated that the quality of the interpersonal interactions in the group would be positive.

The inevitable interpersonal conflicts that are generated in groups with relatively dense interpersonal interactions were solved efficiently by focusing on tasks. For example, conflicts over the use of equipment were resolved by getting additional equipment, making scheduled use of equipment clear, or by providing training on proper use of equipment.

The general sense of these preliminary data is that the chemists studied are clearly fascinated with their work and derive satisfaction from thinking about and conducting experiments in chemistry. Although they feel relatively uncomfortable with several aspects of interpersonal interactions and express varied need for social support, group members interacted often and these social interactions were important to the scientific endeavor and to the personal satisfaction of the members.

Many lay people have the conception of scientists as social isolates with few social skills and relatively little interest or need to interact socially. Clearly, this stereotype poorly described the members of the Crim and West groups. Rather a picture could be painted of efficient groups whose members were task oriented but who interacted often and derived much satisfaction from those interactions As a psychologist who studies interpersonal interactions and who believes that these interactions are critical to the success of work groups, I am not surprised that these two groups are renowned for their accomplishments in chemistry.

The groups I studied have learned to solve problems successfully through a focus on task. Solving interpersonal problems, however, by focusing primarily on tasks ignores the characteristics of people that lead to interpersonal problems. Frequently, problems occurring in group situations are caused by the interpersonal style of one or two members of the group. Rearranging equipment, changing schedules, moving lab spaces, and other task solutions, while efficiently solving the immediate problem, do not focus on interpersonal style issues. Although there are personal characteristics that are difficult to change, people can alter many of the aspects of their interpersonal style when problems are solved socially.

I want to take this opportunity to thank Professors Crim and West and the members of the groups for their enthusiastic participation in the pilot investigation. Based on the data collected, it is clear that this type of research is feasible and informative.

Ice & Seraphim (cont.)

electronic mail for transferring files of data as well as messages. Giles Henderson (Eastern Illinois University) published the classic paper, "How a Photon is Created or Absorbed" in the Journal of Chemical Education in 1979. It struck us at JCE:Software that this paper would be much more effective if it had been published now rather than in 1979, because it is now possible to incorporate dynamic figures (computer animations) illustrating what happens to the electron cloud of a hydrogen atom when a photon is absorbed or emitted, instead of the few static snapshots that had been possible in the print medium. Bob Rittenhouse, visiting in the summer from Walla Walla College, had developed a special algorithm for generating shaded surfaces from mathematical functions, and he started working on an animation. When he showed it at a group meeting, David Wright, who was working with us during summer vacation, was so interested that he went home and told his father, John Wright, about it. John saw the possibility of greatly improving the teaching of laser spectroscopy, and so he went to see Rittenhouse straight away. The two began work on generating on a series of animated sequences to depict the interaction of radiation with atoms. The upshot will be a new type of publication, dynamic publication, that will enable us to more fully realize the potential of electronic publishing. In addition to text and still figures as in a normal publication, the dynamic publication includes spreadsheet models and computer-generated animated sequences, all available with one or two clicks of a mouse. As a result of this collaboration and using the talents of Jon Holmes of our staff, we will have published the dynamic, electronic version of Henderson's classic paper before you read this. Henderson is delighted, so much so that he is working on additional papers now that the publishing medium can appropriately illustrate his ideas.

Most of the programs mentioned in this article are available: write J. Chem. Software c/o UW Chemistry Department jcesoft@macc.wisc.edu

THIS 'N' THAT

David Adolf (Ph.D. '91, Ediger) is a Lecturer in the Physics Department at the U. of Leeds, UK.

Bill Albrecht (Ph.D. '60, Willard) retired from Nalco Chemical Co. in 1992. His current activities include volunteer tutoring in the local school system and traveling.

David Barrett (Ph.D. '93, Gellman) has a research position at Burroughs Wellcome.

Bill Carnall (Ph.D. '54, Willard) retired from the Chemical Division of Argonne National Laboratory in 1991.

Peter Chen (Ph.D. '92, Wright) is an Assistant Professor at Spellman College. He returned to Madison in November to attend the Curriculum Reform Planning Conference.

Greg Dado (Ph.D. '93, Gellman) is at Air Products.

Kim Deal (Ph.D. '93, Burstyn) is a postdoc with Michael Welch at Washington U. Medical School, working on a project to develop new radiopharmaceuticals.

Roger DeKock (Ph.D. '70, Fenske) is spending 1992-1994 in the Sultanate of Oman, as chair of Chemistry at Sultan Qaboos University. This is the national university of Oman, founded in 1986. Roger reports that there are 16 faculty, the teaching is in English, and he is looking for candidates for faculty positions.

Steve Fleming (Ph.D. '84, Zimmerman) gave an invited lecture at the 1993 Winter Gordon Conference on Photochemistry. Fifteen former Zimmerman students, about 10% of the attendees, were at this meeting.

Albert J. Fry (Ph.D. '64, Lemal) has been named to the E. B. Nye Professorship of Chemistry at Wesleyan U. He has taught at Wesleyan since 1964 and is currently Director of Graduate Studies and Research.

Elizabeth Gallo (Ph.D. '93, Gellman) is a research scientist at Eastman Kodak.

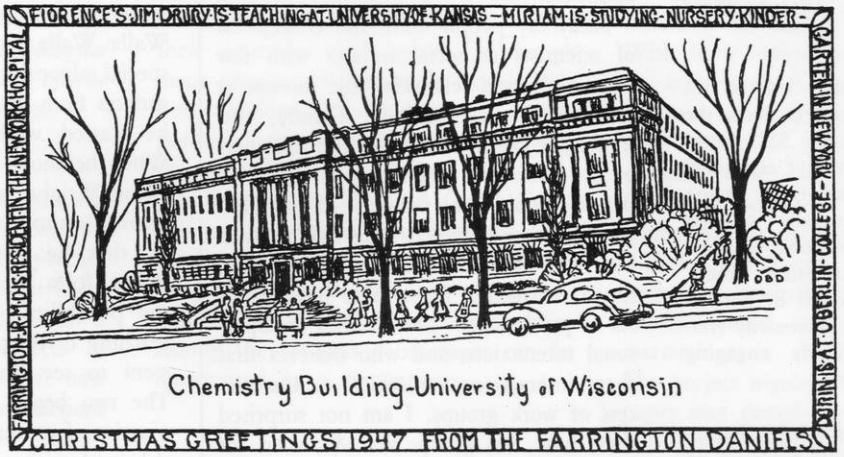
Margret Geselbracht (Ph.D, '92-3, Ellis) is an assistant professor at Reed College. She was awarded one of the 1993 Camille and Henry Dreyfus Faculty Start-up grants to faculty at undergraduate institutions.

William Givens (Ph.D. '59, Willard) is now teaching at Grossmont College in El Cajon, CA.

Jim Guilianelli (Ph.D. '69, Willard), a faculty member at Regis College in Colorado, has initiated several summer sessions for high school teachers and students.

Stan Hager (Ph.D. '74, Willard) is at ARCO which purchased his division from Union Carbide.

Rolf Hahne (Ph.D. '63, Willard) is now supervisor of the Corporate Industrial Hygiene group at Dow Chemical, where he has been for ten years.



Marjorie Huber Swoboda (BS '43, MS '47) stopped in at the Department briefly last summer. She gave us the Christmas card that she had received in 1947 from the Farrington Daniels. She also provided the program from the 1926 Midwest Regional ACS meeting which is pictured opposite.

Joe Ivanecky (Ph.D. '93, Wright) is a postdoc with Alan Campion at U. Texas-Austin.

Mahadeva Iyer (Visiting Scientist, 65-67, Willard) was appointed Director of the Division of Physical and Chemical Sciences of the International Atomic Energy Agency headquartered in Vienna on May 1, 1993. Prior to assuming this position he was Director of Radiochemistry, Isotope and Chemistry Groups, at the Bhaba Atomic Research Centre in Bombay India.

Prof. Dr. Volke Jager (Visiting Professor, '81) moved from Wurzburg to the U. of Stuttgart to assume the chair previously held by Prof. Ulrich Schmidt. His research group numbers around 20 coworkers at this time and the facilities in his new labs are excellent. In his letter, he mentions the partnership between Stuttgart and Wisconsin, indicating that this might provide an opportunity for student exchanges; he also expressed an interest in attracting postdoctoral colleagues from the US.

Tom Kim (Ph.D. '93, Burstyn) started a postdoctoral appointment with Dr. Clare Fewtrell at the Cornell Veterinary School.

Koichi Komatsu Ph.D. '74-6, West) is Associate Professor in the Department of Hydrocarbon Chemistry, Faculty of Engineering, at Kyoto University.

Gloria Kriewall, Assistant Chemistry librarian for the last 10 years, has left to take a position as Manager of Library Programs and Services at Delta College in Michigan.

Brian Laird (Ph.D. '88-9, Skinner and lecturer in the department) began an appointment at U. Kansas as an Assistant Professor Jan., 1994.

Gui-Bai Liang (Ph.D. '92, Gellman) is a postdoc at Cornell.

Jennifer Little (MS '93, Gellman) is an Instructor at Lincoln-Land College in Springfield, IL.

Joseph Marking, an employee of the Chemistry Department for 33 years, celebrated his 100th birthday in February, 1993.

Sun-Il Mho (Ph.D. '83, Wright) returned to the US for a year sabbatical at the U. of New Mexico; she is continuing her conversion to an electrochemist and will pursue this research when she returns to Ajou U. John Wright visited with her when he gave a seminar at New Mexico. The visit also provided the opportunity for a picnic with the Los Alamos branch of the Wright group including **Dale Moore** (Ph.D. '80), **Dinh Nguyen** (Ph.D. '84), **Nigel Cockroft** (Ph.D. '87), and visiting VPI faculty member **Brian Tissue** (Ph.D. '86).

Cathy Murphy (Ph.D. '90, Ellis) has joined the faculty at U. South Carolina.

John Neu (Ph.D. '93, Ellis) is an Assistant Professor at St. Cloud State University.

Eric K. Pham (Ph.D. '89, West) has taken up a position at Operon Technologies, Inc., an Alameda, CA biotechnology firm that specializes in customized DNA.

Chris Rito (MS '91, Gellman) is a research associate at Eli Lilly.

Tom Rizzo (Ph.D. '83, Crim) is leaving U. Rochester to join EPFL (Ecole Polytechnique Federal Lausanne) as Professor of Chemistry.

Jeff Savan (Ph.D., Skinner) holds an NSF Postdoctoral Fellowship at U. of Illinois.

Irving Siegelman (Ph.D. '59, Sorum) is Director of Editorial Support Services for Weekly Reader Corp. in Middletown, CT. He has pursued a career in educational publishing for over 30 years.

Herb Sipe (Ph.D. '69, West) was appointed to the Spalding Chair of Chemistry at Hampton Sidney College at the spring 1993 convocation; later, at the commencement exercises, he was cited for 25 years of faculty service.

DINNER

Mid-West Regional Meeting

of the

American Chemical Society

Madison, Wisconsin - May 28, 1926

SONGS

1

THE CHEMIST AT WORK

(Tune: The Pope he leads a Jolly Life.)

1

The Agric. Chemist's life is gay, life is gay,
He works with things like oats and hay, oats and hay.
He analyzes milk and cheese. He surely leads a life of ease,
He analyzes milk and cheese. He surely leads a life of ease.

2

The Pharmic's life it has few ills, has few ills,
He learns to make all kinds of pills, kinds of pills.
He gets his dope from roots and plants, and formic acid out of ants,
He gets his dope from roots and plants, and formic acid out of ants.

3

I'm glad I learned to analyze, analyze,
I sympathize with those poor guys, those poor guys.
Who never calibrated weights, or washed and weighed precipitates,
Who never calibrated weights, or washed and weighed precipitates.

4

The Geochemist's work is slow, work is slow;
He digs around with pick and hoe, pick and hoe;
He spots galena and stibnite; he also gets some apatite,
He spots galena and stibnite; he also gets some apatite.

5

Electro-chemistry is fine, it is fine,
They work with great big tanks of brine, tanks of brine,
And furnaces as hot as—well, A place I know but will not tell,
And furnaces as hot as—well, A place I know but will not tell.

6

Organic is the course for mine, course for mine,
I think the names are simply fine, simply fine.
Para acet-phen-e-tidin, Di-methyl-oxy-chin-i-zin,
Para acet-phen-e-tidin, Di-methyl-oxy-chin-i-zin.

Thor L. Smith (Ph.D. '48, Ferry) has been in retirement for 1.5 year after a career at IBM Almaden Research Labs, San Jose, CA.

Tom Stein (Ph.D. '92, Gellman) is a Humboldt Fellow at the Max Planck Institute, Munich.

Frank Stewart (Ph.D., '70, West) has left his position at Dow Corning after over 30 years to found Mizu Systems Corp. Headquartered in Midland, MI, Mizu will develop and market transparent polyvinylalcohol hydrogels for use in consumer and medical products.

Ron Wingender (BS '59, Ph.D. '69, Kula) writes to the Badger Chemist to say that he has become Director of NMR Laboratories at the Dexter Corporation.

We have received news that **Eugene Woroch** (BS '44, Ph.D. '48, Johnson) was elected president of the Clara Abbott Foundation. Established in 1940, the Foundation provides educational grants and other financial assistance to employees of Abbott Laboratories. Dr. Woroch retired in 1986 as director of scientific services at Abbott's Pharmaceutical Products Division. He had served on the Abbott Foundation's board since 1988.

Anita Yu (Ph.D. '93, Burstyn) has taken a position at Parke-Davis, joining former colleague **Hairong Zhou** (MS '92, Burstyn).

John Zhang (Ph.D. '93, Ellis) is a postdoc at Harvard with Charles Lieber.

Howard Zimmerman has been keeping track of recent Ph.D.s. In a recent letter he gave us news that **Mike O'Brian** (Ph.D. '93) is a postdoc at Notre Dame and **Pat Wang** (Ph.D. '92) is starting her second year as a postdoc with Jerry Berson at Yale.

IN MEMORIAM

Paul R. Austin (BS '27) died July 18, 1991 at the age of 85. He was Manager of Patents and Contracts at the time of his retirement from DuPont in 1966. After retirement, he continued research at the U of Delaware. He helped establish the Sea Grant Program at Lewes for the College of Marine Studies. He was an authority on chitin and invented a method for dissolving shells of crabs and shrimp without harming the chitin. While at Wisconsin he was assistant director for the UW Band, and he retained an interest and involvement in music throughout his life.

Kenneth G. Hancock (Ph.D. '68, Zimmerman) died unexpected on September 10, 1993 while traveling in Budapest, Hungary. At the time of his death he was Director of the NSF's Chemistry Division. Before moving to NSF in 1977, he had been a faculty member at the U. of California at Davis. His death was a blow to the chemistry community on whose behalf he had worked hard to further chemical research.

G. Ron Husk (PD '64-66, West) died January 16, 1993 in North Carolina. He had retired from the federal civil service in 1992. After holding a faculty position at Villanova for five years, he joined the Army Research Office. From 1973-77 he was the chief of the Army's European Research Office in London. During 1984-5, he held a Secretary of the Army Fellowship at Texas Southwest State U. and at the U. of Texas. He was also an adjunct professor at North Carolina State University.

Thomas Lynn Johnson, II, 73, (Ph.D. '42, Wilds) died November 3, 1992 in Albany, NY. After receiving his doctorate from Wisconsin, he worked for over 43 years at Sterling Winthrop Research Institute at Rensselaer, NY as a chemist and patent agent. He was also patent consultant to the Wisconsin Alumni Research Foundation and a section editor on steroids for Chemical Abstracts.

Gordon G. Knapp (Ph.D. '57, Van Tamelen) died in May, 1993.

Carl H. Krieger (BS '33 in chemistry, MS '38 and Ph.D. '40 in Biochemistry) died May 9, 1993 in Salt Lake City at the age of 82. From 1934-55 he was employed at WARF; he then joined the Campbell Soup Company in Camden, NJ as Director of Basic Research. Later he was Vice President in charge of Product Research (1961-76) and President of the Campbell Institute of Food Research (1966-76). His association with the UW included service as President of the Wisconsin Alumni Association (1974-5) and member of the WAA Board of Directors (1975); he received the distinguished service award of this organization in 1977.

Samuel Lenher (BS, '24) died on December 12, 1992. He had worked at DuPont from 1929 to 1970. In his early career, he held positions of research chemist, manager of Chamber Works, DuPont's largest plant, Director of manufacturing, and then to general manager of the organic chemicals department. In 1955 he became director, vice president, and a member of the DuPont Executive Committee. He also held trustee positions at the U. of Delaware, Johns Hopkins, and Woods Hole Oceanographic Institute. Sam Lenher was the son of Victor Lenher, Professor of inorganic and analytical chemistry at the UW from 1900 until his death in 1927.

Lester G. Lundsted (Ph.D. '42, Atkins) died at his home on Oct. 26, 1992. He was retired Director of organic chemical research at BASF in Wyandotte, MI. He developed Pluronics, a family of anionic surfactants that also serve as polyols for polyurethanes. In 1979 he received the Edward W. Morley Award from the Cleveland Section of the ACS.

Gary Raymond Parr (Ph.D., '73, Taylor) died at home on May 18, 1993. Following Ph.D. studies at Wisconsin and a postdoctoral appointment at Cornell, he held appointments as research associate at Ithaca College, staff fellow at NIH in Bethesda, MD, Assistant Professor at Clemson (1982-87), and Research Scientist at Monsanto in St. Louis (1987-1991). At the time of his death, he was an Assistant Scientist at the UW-Madison, working in Lloyd Smith's laboratory on new methods of DNA sequencing.

Tilman H. Pearson (Ph.D. '51, Wilds) died in April, 1993.

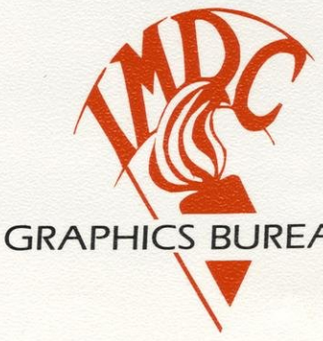
Rex Robinson (Ph.D. '29, Meloche) was professor emeritus at the U. of Washington, Seattle, at the time of his death on Oct. 29, 1992. He joined the U. of Washington in 1929 where he taught and carried out research in analytical chemistry for 42 years.

Dorothy Dana Walton, died at the age of 100 at her home in New York City. She was a 1915 graduate of the UW and the widow of the late UW Chemistry Professor James H. Walton.

Kenneth N. Warner, Jr. (Ph.D. '50, McElvain) died May 26, 1993 in Columbus OH. He was 72 years of age. He worked at Owens Corning Fiberglass Technical Center for 28 years, and was a research associate there at the time of his retirement. He held numerous patents in organic chemistry. He was a former member of the Atomic Energy Commission at Oak Ridge, TN.

Lloyd L. Withrow (MA '23, Ph.D. '25, Walton) died December 9, 1992. A leader in automotive research, he headed the fuels and lubricants department at GM Research Laboratories from 1952-63. His research encompassed problems of engine knock, emissions, atmospheric pollution, and development of improved fuels and lubricants. He received the Horning Memorial award for filming automobile combustion in 1939, and a second Horning Award in 1952 for producing flame photographs of autoignition induced by combustion deposits. In 1986, he was also recipient of the Honda Medal of the American Society of Mechanical Engineers.

We have been notified that **Ralph E. Wood** (Ph.D. '51, Ritter) passed away on March 23, 1992 in Provo, UT.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