

IOWA CHEMISTRY

Newsletter of the University of Iowa, Department of Chemistry, July 2001

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Notes From the Chair

As another year has come and gone, the Department of Chemistry continues its efforts to improve its teaching and research programs. Laboratory construction projects are adding significantly to space for the Department's most active research faculty and their students and postdoctoral associates. The University and NSF-funded fifth floor remodeling project in the Chemistry Building was completed in July of 2000 and space was quickly occupied by Profs. **Gloer** and **Wiemer** and their research groups. This project provided 5,000 square feet of state-of-the-art laboratories and offices for medicinal natural products discovery and for synthesis of medicinally active compounds. The building project on the third floor of the Iowa Advanced Technologies Laboratory (IATL, photo below) was completed in March of 2001. This project



provides 11,800 square feet of research space, half of which will be occupied by Department of Chemistry faculty. Prof. **Linhardt** and his research group are the first of the Department's occupants on the third floor of IATL. Efforts are underway, under the leadership of Prof. **Pienta**, to redesign the way in which freshman chemistry is taught at the University of Iowa. Incorporation of technology that will make learning an interactive process is a key element of this endeavor. A vigorous effort directed to graduate student recruiting and support promises to bring more students of higher quality to the Department. New instruments have been acquired for computational chemistry and mass spectroscopy. Faculty and student involvement in interdisciplinary research and teaching in the biosciences, materials chemistry, and environmental sciences continues to grow.

These are but a few of the many exciting developments in Chemistry at the University of Iowa. As you continue perusing this Iowa Chemistry newsletter, you will inevitably discover many more. Important new elements that you will discover are feature stories on the lives and careers of Iowa Chemistry alumni. At Iowa, we are dedicated to nurturing and renewing acquaintances with our alumni. I invite you to join us in an Alumni Reunion at the National Meeting of the American Chemical Society in Chicago this August.

Alumni Reunion in Chicago

Alumni and friends of the Department of Chemistry are cordially invited to an Alumni Reunion during the week of the National American Chemical Society Meeting in Chicago. Join us from 6 to 8 p.m. at the Palmer House Hilton on the evening of August 28, 2001 for a cool drink, light snacks, and good company. The Palmer House Hilton is located at 17 East Monroe St. We look forward to seeing you at the reunion and hearing about your activities. It will be time well spent!

Frontiers Lectures for 2001-2002

George McClendon, Chair of Chemistry at Princeton, and Henry White of the University of Utah, will visit during the weeks of September 3 and September 17, 2001, respectively. Carolyn Bertozzi of UC-Berkeley will be here the week of March 25, 2002. Ann McDermott of Columbia University will visit during the spring. Come join us and hear these eminent scientists recount their recent research successes. Check our web site for up-to-date information.

Nair Receives the Midwest ACS Award

In late June, it was announced that Prof. Vasu **Nair** received the 36th Midwest ACS Award for 2001. This award was established by the St. Louis section for the ACS Midwest Region in 1944 to publicly recognize outstanding achievements in chemistry made in the Midwest region. The award is conferred annually on a scientist who has made meritorious contributions to the advancement of pure or applied chemistry or chemical education, and the profession of chemistry. To be eligible, a nominee's cited work must have been performed while he or she was residing within the Midwest Region of the ACS, which includes Missouri, Arkansas, Iowa, Nebraska, Kansas, Southern Illinois, and South Dakota. Nominees can be from industry, academia, government, or private practice. The Award consists of a medal and a \$2,000 honorarium. The award for 2001 will be presented at the Midwest Regional Meeting to be held in Lincoln, Nebraska on Thursday, Oct 11th, at the Cornhusker Hotel. Prof. Nair's award address will be presented at the Midwest Award Banquet. Prof. Nair joins two other chemists from the Department (Stan **Wawzonek** and Don **Burton**) who received the award earlier. Keep up the good work, Vasu!

Metal Chimeras Take a Bite Out of DNA

Third-year Assistant Professor Sonya **Franklin** has received national recognition as a recipient of a prestigious National Science Foundation Faculty Early Career Development (CAREER) Award. This very competitive award recognizes the research and teaching potential of faculty “most likely to become the academic leaders of the 21st century”. This award provides significant research funding over a 5-year period. Prof. Franklin’s research program involves the coupling of components of two important proteins, one with DNA binding ability and another with strong metal binding ability, to produce a chimeric protein that retains binding characteristics of *both* proteins. This strategy represents a novel branch of an emerging field of de novo metalloprotein design, where chemists attempt to mimic nature’s ability to selectively cleave DNA. These synthetic endonucleases may have potential as probes of local DNA structure and may find use in chemotherapeutic and selective DNA sequencing/cleavage systems. Franklin’s lab is also working to better understand the structure and function of a zinc-binding protein implicated in multiple sclerosis.

Grassian Opens the World's Eyes

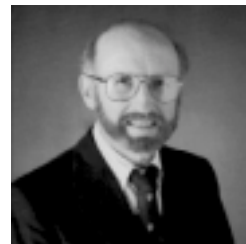
The American Chemical Society, the world’s largest scientific society, saluted the National Science Foundation on its 50th Anniversary. Prof. Vicki **Grassian** was chosen as an example of how chemical scientists help the world and how what she learns in her research will aid the world in preparing for its future. Prof. Grassian and her research team at the University of Iowa are working to understand how particulate matter and chemical reactions on these particles are affecting the earth’s atmosphere. The department is proud of Grassian’s research contributions and especially delighted with the recognition she is receiving in the national and international arenas.

Nair’s Dinucleotide May Stop HIV Infections

Prof. Vasu **Nair**’s research group has created a hardy new molecule that they think can survive longer than existing treatments to combat the virus that leads to AIDS. The “scientific advancement in the area” is reported in the June 21st edition of the *Journal of the American Chemical Society*. Existing drug treatments for HIV face ongoing problems with drug resistance and toxicity, making the Nair study relevant to medical treatments of current patients. Called an HIV integrase inhibitor, the potential new drug stops a key step that allows the virus to infect people. The new dinucleotide was created using complex genetic engineering techniques. Development of a potential solution to stopping integrase, which inserts viral DNA into healthy cells, would allow doctors another chance to stop the onset of AIDS if the other drugs are unsuccessful. It is not a vaccine for the virus, but ideally it

may represent another approach to combating the spread of the disease, Nair said. Much more testing is necessary before the compound can become a drug, he continued.

Physical Chemist Robert Coffman Retires



Bob Coffman received his Ph. D. from the University of Minnesota in 1964 and joined our Department in September 1967. His initial research was in the area of theoretical and practical projects in ESR. During that time, the technology underwent vast changes! He worked on the dynamic Jahn-Teller effect, crystal field theory, spin mechanics, exchange coupling, magnetic geometry in transition metal-radical pairs, cobalamins, ferredoxins, long range exchange, interpretation of mechanisms of exchange coupling, many-body theory, ESR lineshape theory and strain coupling, calculation of one and two-center molecular integrals (with STOs!), and the Mulliken approximation. Typical of Bob, he wrote his own Huckel, CNDO and INDO molecular energy programs with density matrix analysis. He also developed a theory for ortho-para hydrogen conversion and worked on a density matrix theory for super-exchange. Bob lists his second Ph.D. student, Gary **Buettner**, as his EPR successor at the University of Iowa. Gary is the Director of the ESR Facility at the College of Medicine and has recently been appointed Professor in the Department of Radiation Oncology. Bob was active in bringing computer technologies to the Department. He pioneered the use of various visualization techniques in courses he taught, particularly the undergraduate and graduate level physical chemistry courses. Bob actively participated in teaching both laboratory and lecture courses. He provided an environment for his graduate students to develop independence and to become critical scientists. Bob has contributed to the Department over the past 34 years and will be missed.

Now that his retirement has started he is making plans for the next phase of his life. He and his wife, Birgit, are leaving in July for Sweden and Denmark on a “roots” trip. In the fall, they will spend some time in Marseille, France visiting their daughter Annemarie, “le beau-fils” Laurent, and their grandchild “Benjie-Bob”. Bob also has long range plans to read more modern Danish literature (i.e. Vilhelm Moberg and Karen Blixen) and improve his skills with the French language. As a ‘fun’ activity, Bob has been working on “Kanji”, as he and Birgit plan to visit Japan once again. He will continue surfing the Web on his Mac Cube. Bob also fills his ‘spare’ time trying hard to get his “Ribes” class of plants to grow in the relatively tropical climate of Iowa! Bob, enjoy your ‘free’ time and let us know what you are doing!

ALUMNI SPOTLIGHTS

Manville I. Bro

A Communications Pioneer

Manville I. “Whitey” **Bro** is a pioneer of the communications industry, though in a special way. Bro earned his Iowa Chemistry Ph.D. in Organic Chemistry in 1951 under the guidance of Prof. Ralph **Shriner**. Also in 1951, he joined the Polychemicals Department at E.I. DuPont de Nemours, and soon mounted a vigorous research program on fluoropolymers.

His significant achievement was the invention of Teflon[®] FEP. The following description of Bro’s efforts is paraphrased from *DuPont Magazine* **2000**, 2, 22-24. When Bro joined the effort, Teflon[®] was noted as a chemically resistant, tough, crystalline polymer. However, DuPont was looking for a Teflon[®] that could be melt processed to form tubing and coat wires and that could be injection molded to make durable, heat and corrosion resistant objects. Bro experimented with various copolymer formulations, and from these efforts was born Teflon[®] FEP, which DuPont patented in 1960.

In addition to his basic research efforts, Bro contributed to the development and marketing of Teflon[®] FEP. In the early days after Bro’s discovery, Teflon[®] FEP was used to insulate wires and cables, to make tubing of various diameters, and to line pipes and valves that are used in the chemical processing industry. The polymer really took off as the computer industry grew and computer networks proliferated. Teflon[®] FEP is the material of choice for the networking cable that is sometimes referred to as plenum wire. The plenum spaces in buildings are the areas above dropped ceilings through which plenum wires run that connect computers and other devices into Local Area Networks. Plenum spaces contain not only computer cable but also insulated cables for telephone, electricity, and other applications and, therefore, the flame resistance of Teflon[®] FEP is a safety bonus. Nothing brings this message more to mind than the high-rise fires of the 1970s, such as the MGM Grand fire in Las Vegas, when older, flammable wire coatings promoted rapid spread of the fire through the plenum spaces. The superior fire resistance and insulating properties of Teflon[®] FEP insure that applications for the polymer will continue to grow in fields as diverse as computer cables and home wiring.

Bro retired from DuPont in 1985, but continues as a consultant for the company two days a week, answering customer questions about Teflon[®]. In 1999, DuPont established the Bro Award for Achievement in Fluoropolymers. Manville I. “Whitey” Bro was the first recipient of this honor.

Orwin L. Carter

A Lifetime of Learning

Even from his undergraduate days at the University of Iowa, Orwin **Carter** dedicated himself to a lifetime of learning. During his UI days, he was involved in a range of campus organizations, including the professional chemistry fraternity Alpha Chi Sigma and the Army ROTC, and did undergraduate research with Prof. Robert **Buckles**. When he graduated with honors and highest distinction in 1964, he was at once commissioned a 2nd Lieutenant in the Chemical Corps. Graduate study in X-ray crystallography at the University of Illinois came next, and he marched through to the Ph.D. in 1967. After graduate school, he taught general chemistry and physical chemistry for several years at West Point to fulfill his Army commission.

In 1970, Carter began an industrial career at Rohm and Haas Co. in Philadelphia. Though he applied his physical chemistry background to various ventures, such as development of industrial coatings and house paints, an event in 1974 would reshape his view of the chemical sciences. It was then that he became Director of Product Development for Micromedic Systems, a division of Rohm and Haas. Under his leadership, Micromedic Systems developed medical diagnostics that were based on the new technique of radioimmunoassay. Carter immediately grasped that a Ph.D. was a license for lifelong learning. He devoted himself to industrial applications of immunology, despite the fact that he never took a life science course after high school!

In 1977, Carter joined Becton Dickinson as Associate Director of Immunodiagnostics, and less than a year later was Director of Immunology and Acting Director of the Corporate Research Center in Research Triangle Park, NC. In 1980, he left the R&D side and joined the management side as Vice President and General Manager of the Manual Immunodiagnostics Strategic Business Unit for Becton Dickinson. Career steps were yet to follow as President of Amersham Corporation and as President and CEO of Immuno Nuclear Corp. By his retirement from industry in 1995, he had moved from physical chemistry to medical diagnostics to corporate manager to corporate CEO. The lifetime of learning that he recognized in 1974 had served him very well indeed!

Though supposedly retired, Carter was by no means finished with lifelong learning. He serves four companies on their Board of Directors, and in 1996 decided to give academics a try as Vice President of Finance and Administration at Hamline University. His second try at retirement, in 1999, has apparently taken. He and his wife, Anita, are enjoying their leisure time in Stillwater, Minnesota.

Ralph Shriner Graduate Student Fellowship Fund Established

With generous support from Fred and Bonnie **Raths** of Indianapolis, Indiana, the department announces the establishment of a Graduate Student Fellowship Fund in the name of Prof. Ralph **Shriner** (photo at right, taken soon after his arrival at Iowa). Fred earned his Ph.D. degree in Chemistry at the University of Iowa in 1954, working under the guidance of Prof. Shriner. Ralph Shriner not only inspired graduate students to excel in their studies, but also provided leadership as Chair of the Department in the 1950s and early 1960s. The first Ralph Shriner Graduate Fellowship will be awarded in the upcoming academic year.



Karl E. Wieghardt: Ida Beam Lecturer

Prof. Wieghardt presented three Ida Beam lectures in April: "Essential Ultratrace Elements: What Do We Need Them For?", "Metalloproteins as Blueprints for the Design of New Homogeneous Catalysts", and "Does Pentavalent Iron Exist in Biology and Coordination Chemistry?". He is recognized internationally as a leader in the interdisciplinary area of Bioinorganic Chemistry. He is also the managing Director at the Max Planck Institute for Strahlenchemie (radiation chemistry). His primary research focus is the design and structural definition of coordination compounds that model the active sites of metalloenzymes. Nearly half of all enzymes contain metal ions, and the transition metal-containing enzymes employ a wide range of metal-ligand geometries, coordination numbers, and oxidation states. In his efforts to understand the fundamental reactivity and mechanisms of these biomolecules, Prof. Wieghardt designs synthetic ligand frameworks that favor distorted geometries or dinuclear metal complexes. Prof. Wieghardt is particularly well known for his successful preparation of dinuclear iron complexes that mimic the oxidation numbers and active site geometry for oxygen-activating iron proteins. He has applied the same insight to synthesis of polynuclear manganese clusters as models for the water-oxidizing, four-manganese center of photosystem II found in the plant photosynthetic system.

New Undergraduate Environmental Chemical Sciences Major

Several years ago, a new degree program, a Bachelor of Science in Environmental Sciences, was introduced in the College of Liberal Arts at Iowa. The program is not part

of any one department but, rather, is the result of the collective efforts and interests of several departments, including biology, geology and geography. The Environmental Sciences program initially consisted of three degree tracks: Geosciences, Biosciences, and Hydrosociences. This past year a fourth track (Chemical Sciences) was introduced into the curriculum by Prof. Vicki **Grassian**.

Chemistry is a field that is of central importance to environmental science and, clearly, should be part of any degree program in Environmental Science. In addition, there is ample evidence that undergraduate students at Iowa are interested in obtaining a degree with an emphasis on environmental chemistry. The chemistry track complements the existing tracks and provides students with an important opportunity to combine their interests in chemistry and environmental science.

A degree in Environmental Sciences with a concentration in chemistry prepares and trains our undergraduate students for existing and expanding educational and employment markets. Upon successful completion of the program, our students are well prepared to enter graduate programs in Environmental Chemistry. The employment outlook for graduates of the Environmental Science program is expected to be very good for the foreseeable future due to compliance with federal, state, and local environmental regulations.

General Chemistry in the New Millennium

The introductory chemistry courses at Iowa are likely to have had an impact on virtually all former undergraduate and graduate students and faculty. So what's new with Iowa's general chemistry program? Maybe the place to start is with some comments about all those things that haven't changed! We continue to have over 3700 students per academic year in the preparative chemistry class (4:007), the traditional general chemistry sequence (4:013, 4:014, 4:016), and the introductory course for chemistry majors (4:018, 4:019, 4:020). Hosts of graduate teaching assistants have been introduced to the agony and ecstasy of problem solving with several dozen undergraduates in discussion and laboratory sections. The lecture halls in 225 and 300 CB continue to get extensive use for these courses and organic chemistry. Our efforts to get the outdated 300 CB facility closed and repurposed have reached the sympathetic ear of several new administrators. We are confident that several of you can report hearing promises related to that issue made numerous times over the last 15 or more years.

Back to the changes. If you do not recognize some of the courses mentioned above, the chemistry majors and chemical engineers together with students from biomedical engineering participate in separate courses that were split out in the fall of 1995. It is a positive recruiting tool to tell

potential chemistry majors that they will be enrolled in sections that are 60 to 70 students in size. Our faculty report higher satisfaction with a group that is more interested in the content than the outcome. Furthermore, we are able to provide a more suitable laboratory experience for them.

The general chemistry sequence continues to have an infamous reputation, but we have a new general chemistry coordinator to worry about it. Prof. Norb **Pienta** joined the faculty in the fall of 1999 from University of North Carolina at Chapel Hill. When introduced to President Coleman upon his arrival, she commented that she was happy to have someone join the faculty at Iowa "...who would make entering students' experience in chemistry more positive and rewarding...". A grant from the Pew Program in Course Redesign is helping us implement some changes. We are planning to reintegrate the laboratory with the lecture for both semesters, an idea with pedagogical value and part of a practical solution to the new ABET accreditation requirements for all engineering students (i.e., a one semester chemistry course with integrated lab). Full implementation probably awaits the release of Botany space in the building when they move to the Biological Sciences building currently under renovation. A second plan already being implemented is a change in the method of discussion sections. In order to increase student participation, the sections will be reorganized so that students work on assignments in pairs and the TA role changes to mentor or facilitator from that of mini-lecturer. These assignments will be delivered to the students via computers in a dedicated classroom equipped with wireless communication technology. Pilot testing will start this summer.

One of the continually vexing problems is the need to assign student homework and the difficulty of grading it so that the feedback is useful to the students. The order of magnitude calculation is stifling (500 students x 15 assignments x 20 problems x 5 minutes to grade each problem). That's over 12,000 hours or 42 full-time TAs for a semester. Enter the world of software or homework delivered and graded via the Internet. We have been pilot testing a package called "Mastering Chemistry" for the last three semesters. Students have practice modules that give answers and some feedback. The system is set up so that they can repeat the unit tests as often as they can tolerate them, since the questions are generated by algorithm. We continue to experiment with the best ways to optimize compliance and success of this approach.

Other items in the planning or development stages include a web-based tutorial on math, calculator, and word problem skills and placement tests delivered electronically. Both of these projects were recently funded by the National Science Foundation Division of Undergraduate Education. The former attempts to provide an opportunity to review math and algebra and to identify need for help in these areas. The latter will be used to place students to the prep chemistry course (4:007) versus the main general

chemistry class (4:013) and as an evaluation tool to objectively monitor student learning as they navigate the sequence of courses.

Look for our progress in future newsletters or in the chemistry education literature. Send your comments and suggestions to Norb Pienta (norbert-pienta@uiowa.edu). We are interested in hearing your anecdotes about teaching in the general chemistry program from days gone by and getting copies of any pictures related to teaching.

Director of Undergraduate Laboratories, Lynne Cannon, Retires



In 1987, Dr. Lynne **Cannon** joined the Chemistry Department as Lab Coordinator. At that time, there was no lab coordinator and she was not sure that there would be enough to do to warrant hiring a full time person. She soon realized that was a naïve prediction. In fact, the work soon required two or more people to keep the lab courses running smoothly. Her responsibilities started with Principles of Chemistry Lab (04:016) and, before the first semester had passed, Organic Chemistry Lab (04:141) was added. As time went on, she ironed out glitches and became responsible for additional courses until all the lab courses were under her oversight. The new lab courses always added new challenges. She also had the opportunity to work with new and visiting faculty who taught lab courses. Her tasks included the complete and accurate preparation of reagents for all lab courses and maintaining lab equipment in good working order. Needless to say, Lynne enjoys working on overload most of the time and interacting with faculty, teaching assistants, students, and staff.

Three years ago, she assumed the role of Director of Undergraduate Labs. At that time, Steve **Bullard** joined her staff and took over the day-to-day preparation of reagents for labs, purchase of reagents, and maintenance of equipment. This support provided her more time for long-term projects related to the smooth operation of the lab courses. She also served as the Department Safety Officer, which included maintaining records of all injuries in the Department, assisted in Chemical Orientation (04:191) for incoming graduate students, developed a safety quiz taken by all students in each lab course, served as chair of the Safety Committee, and held a Department Safety Program each January. She worked with faculty members, particularly those who were new to the Department, to develop course packs, suggest possible additional experiments, edit the Principles of Chemistry Lab manual, and also served on various committees involved with curriculum development. From its inception, she served on the Lab Fee Committee (students pay lab fees which

provide funds to upgrade instrumentation) that made our courses more state-of-the-art; part of this assignment required ordering major equipment for the labs.

She also enjoyed the privilege of teaching Technology and Society, Organic Chemistry Lab, and parts of Organic Chemistry I and II, and spent a sizable number of hours counseling students, particularly those who did not enjoy chemistry courses. She has said that no two days were alike; however, this made her time in the Chemistry Department challenging and interesting. Her enthusiasm and motivation are revealed in her statement: "I want to thank the Department and the four chairmen that I worked under for the privilege of being part of the University of Iowa Chemistry Department".

Although Lynne has formally retired, she will continue her input into reforming chemistry courses; she is working with Prof. **Pienta** on projects close to her heart. She also has plans to travel abroad with her husband and visit with their children and grandchildren. There is no doubt she will continue to run on overload. The Department greatly appreciates Lynne's groundbreaking work as the Director of Undergraduate Laboratories. She will be missed!

Good News From Our Faculty

Lou **Messerle** has received significant funding for his organometallic and inorganic cluster chemistry, with a major portion of the funding for development of new diagnostic X-ray and MRI imaging contrast agents. Support has been received from: Cystic Fibrosis Foundation, Roy J. Carver Charitable Trust, National Science Foundation, National Institutes of Health, National Center for Research Resources, and National Cancer Institute.

Vicki **Grassian** is organizing a symposium for the Fall 2001 National Meeting of the American Chemical Society entitled "Physical Chemistry of Gas-Particle Interactions", to be held in Chicago, Illinois. She has also been invited to be a keynote speaker at the special session in the U.S.-Germany Cooperative Research: International Workshop on Multiphase Atmospheric Chemistry at the European Aerosol Conference Multiphase Chemistry. This will be held in Leipzig, Germany (Sept. 3-7, 2001). She will give a talk and lead a discussion on Heterogeneous Chemistry on Mineral Dust. Vicki has also received large grants this past year to support her research. These grants include: a three-year grant from the National Science Foundation (jointly funded by Surface and Analytical Chemistry and the Atmospheric Sciences Division) and a four-year grant with Prof. Gregory Carmichael (Chemical and Biochemical Engineering) from the Department of Energy-Atmospheric Chemistry Program.

Don **Burton** was invited to speak at several conferences throughout this past year. He was the Keynote Speaker at the International Fluorine Symposium in Durham,

England, he participated in two symposia at the ACS National Meeting in San Francisco, and a symposium at the Pacific Basin Chemistry Conference in Honolulu. He was a seminar lecturer at Clemson University and the University of Minnesota. He was a lecturer at the 15th Winter Fluorine Conference in St. Petersburg Beach, FL, and also had a poster there. In addition to mentoring students in our Department, Don is trying his hand at distant learning! He recently "co-directed" a student completing a senior research project in Venezuela; Don's expertise was invaluable in inserting a CF₂ group in an ether.

CCD Timesaver for X-Ray Lab

The state-of-the-art Nonius Kappa CCD X-ray diffractometer, which was funded by the Roy J. Carver Charitable Trust, was delivered in late December and installed in January. This diffractometer employs an X-ray sensitive phosphor screen coupled via a fiber optic taper to a charge-coupled device (CCD) area detector. Using an area detector increases data collection rate by a factor of about 25 over a standard serial diffractometer that uses a scintillation crystal point detector. Dr. Dale **Swenson**, Director of the X-Ray Facility, reports that as of the first of March more than 25 data sets have been collected; some in as little as three hours. Because the phosphor based CCD detector is more sensitive, smaller crystals than previously possible can be examined. Additionally, the system has software to deconvolute the diffraction data from twinned crystals. This is a problem that is generally intractable with data from point detector diffractometers. The diffractometer also is equipped with an Oxford Cryosystems computer-controlled crystal cooling system. This system allows data collection down to 100 K and adds the possibility of automatically collecting data at a variety of predetermined temperatures on a sample. As part of the proposal, the X-Ray Facility will provide small molecule single crystal service to a number of liberal arts colleges in eastern Iowa and western Illinois. This will allow these colleges to use crystallography as a tool for chemical research where cost would have inhibited its use. These collaborations started in April. The CAD4 serial diffractometer with Cu radiation will still be used to determine the absolute configuration of a stereo-isomer containing only light atoms (atomic number 14 and less). A molecular crystal from Prof. Len **MacGillivray's** group was recently solved using the new CCD system (see below). This crystalline molecular assembly consists of a naphthalene dicarboxylic acid framework designed to encapsulate a photoactive bis-[2-pyridyl] ethylene.



Fast Checkout with Lasers

The Chemistry department's teaching and research mission is supported on a daily basis by the capable and efficient staff that runs our internal Chemistry Stores operation. All chemicals, supplies, and instruments for teaching laboratories and research endeavors are obtained through this unit. Gene **Hauge** manages the day-to-day operations of the Chemistry Stores and is assisted by Tim **Orris**. They interface closely with the personnel in the main Chemistry office and coordinate expenditures on grants and contracts. In addition to placing orders, suggesting vendor alternatives, and tracking open orders, they oversee a rotating group of undergraduate students who work part time in the store.

The continuing faculty success in grants and awards has increased purchasing to record levels and, at the current rate, sales for 2001 are on track to once again break new ground! In the past five years, the number of items carried by the store has increased over 40 % and annual sales last year nearly topped \$2 million, up from \$1 million just five years ago. The most important modernization step this year involved the implementation of a new computer checkout system. This Windows-based software has been successful in improving stock oversight and customers seem to enjoy using the laser checkout gun. There were initially a few humorous (in retrospect!) incidents with the new system, however, because pressing the laser button twice sometimes caused a faulty entry that resulted in a single ream of paper costing nearly \$140 million (and you thought the Army's \$100 K hammer was expensive!).

In addition to his daily store oversight, Tim Orris recently initiated a monthly Chemistry Stores newsletter that details a variety of happenings in the department and store. These include notes on safety issues and accidents, ordering suggestions, new procedures and stock items, faculty/staff arrivals and departures, recently minted Ph.D.'s, and new births.

Missing Good Luck Bust of Chemistry Faculty Found

Some students before taking an exam in the Chemistry Building would rub the nose of a bronze bust located near one of the lecture rooms for 'good' luck. The bust of Prof. E.W. **Rockwood**, a member of the chemistry faculty and director of University Hospitals who died in 1935, disappeared and reappeared quite regularly. Sometime in 1984, the bust was taken and was not found until last year when police pulled it out from the Raisin River near Adrian, Michigan. The bust was found when police were looking for evidence in a robbery. Emeritus Chemistry Prof. Jack **Doyle** provided much history about the bust to a local newspaper. As a reward, the newspaper stated that 'Doyle died earlier'. We are happy to announce that Jack was alive when he was teaching and is still enjoying retirement!

GAANN Progress Continues

An intense and organized effort to recruit under-represented minority graduate students (African-American, Hispanic, and Native-American) has been in progress during the past three years. This is supported by a Department of Education GAANN (Graduate Assistance in Areas of National Need) grant written by Prof. Darrell **Eyman** and awarded in 1998. The award provides three-year fellowships for up to seven students per year, and guarantees equivalent stipend support for an additional two years. The primary objective of this program is to increase the number of under-represented minority students who obtain the Ph.D. degree in Chemistry and pursue a career in teaching or research. Identification and recruitment of qualified GAANN students has required that faculty make multiple trips to undergraduate institutions in Illinois, Georgia, Louisiana, Texas, Virginia, and Wisconsin. Continuing contacts by e-mail and telephone are pursued with other colleges and universities in Colorado, Mississippi, and Texas. At the time the grant was awarded, there was one under-represented minority graduate student enrolled in the Department. This academic year there are nine. In addition to students who have been awarded GAANN fellowships, four other under-represented minority students have enrolled in our graduate program during the past three years. We are currently exploring ways to continue funding this program.

Graduate Students

This past year chemistry graduate students totaled 90. There were 9 Masters degrees awarded to (advisor's name in parenthesis): Jason **Cox** (Geng), Harold Jerome **Coyne** III (Goff), Scott **Cullison** (Gillan), Xiuchun **Gao**, (Totah), Xiaomin **Fu** (Goff), Yecheng **Huang** (Goff), Piyush **Patel**, (Young), Linhong **Yang** (Wiemer), and Man **Zhang** (Simeonsson).

There were 12 Ph.D. degrees awarded in Chemistry. Here is a listing of the new Ph.D.'s that were directed by faculty in the Chemistry Department; their advisors and dissertation titles are enclosed in parentheses.

Eric **Blumenthal** (Burton: The Copper (II) Salt Mediated Stereospecific Preparation of Fluorinated Symmetrically Conjugated Polyene Systems), Patrick **Carl** (Larsen: Characterization of Transition Metal Exchanged Zeolites by Electron Paramagnetic Resonance Spectroscopy), Seth **Elwood** (Simeonsson: Development and Applications of Laser Enhanced Ionization, Laser Induced Fluorescence and Photoionization Detection Systems for Elements and Compounds), Muhsin **Ezer** (Simeonsson: One and Two Color Laser Induced Fluorescence Studies of Cadmium, Antimony, and their Elements in Electrothermal Atomizers, Inductively Coupled Plasma and Flame), Angela **Goodman** (Grassian: A Spectroscopic Study of Heterogeneous Reactions of Nitrogen Oxides and Sulfur Oxides on Solid Particles of Atmospheric Relevance), Vinod **Jairaj** (Burton: A Novel Approach to the

Stereospecific Preparation of Polyfluorinated Silanes, Stananes and Other Fluorinated Organometallic Compounds), Yi **Liu** (Pietrzyk: Capillary Electroseparations with Wall Coated and Porous Polymer Packed Fused Silica Capillaries), Sandy **Lukaszewski** (Burton: Preparation And Functionalization of (Z) and (E) 1,2-Difluoro-1-Tri-N-Butylstannyl-1,4-Pentadiene), Travis **Mickle** (Nair: Anti-HIV Nucleosides and Nucleotides: Synthesis and Correlation of Electronic Structure with Antiviral Activity), Shelley **Minteer** (Leddy: Magnetic Field Effects on Electron Transfer Reactions), Hazel Lawrence **Pacquette** (Simeonsson: Ultratrace Determination of Arsenic, Selenium and Antimony by Hydride Generation with Laser-Induced Fluorescence and Laser-Enhanced Ionization Detection Methods). Ronald Steven **Sikorski** (Quinn: Computational and Experimental Exploration of Low Barrier Hydrogen Bonds and Transition State Models for Serine Esterase Enzymes).

Undergraduates Students

We had 90 undergraduate majors in the fall semester with 5 of those graduating in January. There were 84 majors this spring with 12 of those graduating in May 2001. The undergraduate research experience continues to be an integral part of our student's education. Each spring, we have a poster session where they share their research experience with the Department. At this time, the Chemistry Alumni Awards are announced. This year's recipients were:

Sophomore: Adam **Christensen**

Junior: Shoshannah **Roth**

Seniors: Stephen **Maldonado**, Ryan **Minikis**, Farid **Moussavi-Harami**, and Parisa **Taravati**

The Russell K. Simms Scholarships were earned by: Michael **Kammerer**, Jennifer **Mann**, and Farid **Moussavi-Harami**. Anthony **Prudden** and Jennifer **Rathe** earned the Kenneth Sando Scholarships.

The Honors Program presented 5 awards to Chemistry Undergraduates. Two Chemistry students, Adam **Christensen** and Joshua **Everts**, each won a Rhodes Dunlap Scholarship, established through a bequest of Samuel Rhodes Dunlap, founder of the Honors Program, which recognizes undergraduate students for outstanding academic achievement in the Honors Program. Stephen **Maldonado** received the Sanxay Prize; this award is given to a University of Iowa Liberal Arts senior who shows the highest promise of achievement in graduate study. Maldonado will begin graduate studies this fall at the University of Texas, Austin, as an NSF Fellow. Farid **Moussavi-Harami** received a Collegiate Scholar award based on his academic accomplishment. Shoshannah **Roth** received the Goldwater Scholarship; this scholarship is designed to foster and encourage outstanding students to pursue careers in the fields of mathematics, natural sciences, and engineering.

Research and Visiting Scientists and Postdoctoral Associates

In addition to undergraduate and graduate students, many research groups have major contributions from research and visiting scientists and postdoctoral associates. A list of the research and visiting scientists, their home institutions, sponsors, and projects are as follows:

Dr. Airat **Amerov** from Kiev State University (Ukraine) is working with Prof. Arnold on the characterization of kromoscopy for noninvasive blood glucose sensing. Dr. Kang-yeon **Jung** from Kangnung University (Korea) is working with Prof. Wiemer on the synthesis of phosphonate derivatives of ara-C, an important anti-leukemia drug. Dr. Dean **Katahira** from Ripon College worked on solution routes to germanium and tin nitrides during the fall semester with Prof. Gillan. Dr. Minna **Xu** from the University of Petroleum in Beijing is working with Prof. Grassian in the area of environmental photocatalysis. In particular, she is investigating the photooxidation of cyclohexane in cation-exchanged zeolites for environmentally benign synthesis and the photooxidation of benzene on TiO₂ surfaces as a remediation technology.

Dr. Luke **Grocholl** is working with Prof. Gillan on organometallic gallium amide precursors and solvothermal routes to GaN nanoparticles. Dr. Ping **Li** is working with Prof. Grassian in evaluating the role of heterogeneous chemistry of volatile organic compounds in the troposphere. Dr. Steve **Sikorski** is working with Prof. Quinn on the experimental and computational characterization of enzyme-substrate interactions for enzymes that hydrolyze choline esters. Dr. Amandeep **Sra** is working on Prof. Kohen's enzyme nitrogenase project. Dr. Jianjun **Wang** is working with Prof. Gillan on the chemical vapor deposition of carbon nitride films and electron microscopic analysis of main-group nanomaterials.

Visiting Faculty

As we reported last year, Dr. Lisa **Fields** was leaving the teaching field to become a full time mom. She and her husband found themselves flying on Mother's Day to Columbia, South America, to pick up their twin boys, Samson Sergio and Maximilian David Fields. Congratulations, Lisa and Malcolm!

Dr. Burak **Esat** joined the faculty as a Visiting Professor in the spring semester of 2001 and taught Organic Chemistry II and Organic Chemistry Lab. Burak received his Ph.D. from the University of Massachusetts in January 2001.

Dr. Allyn **Ontko** also joined us as a Visiting Professor and taught the Principles of Chemistry Lab in the fall semester and the Technology and Society Lab and Chemical Science Lab in the spring semester. He has accepted a

position at the University of Minnesota-Morris for next fall. Allyn was also a postdoc working for Prof. Eyman.

Dr. Christopher **Coretopoulos** (University of Illinois), Dr. Doris **Eckey** (University of Minnesota), Dr. Peter **Hansen** (Iowa State University), and Dr. Russell **Larsen** (Harvard University), continue to make important contributions to our undergraduate courses.

Notes And Updates From Alumni

It is great to hear from our alumni. Let us know what you are doing so we can spread your news in next year's Newsletter. You can fill out the form at the end of this issue and send it to us or use the electronic web options noted on that page. We try to publish verbatim responses, if possible. Last year's submissions follow.

Charles **Anderson** (1941, B.S. Chemistry, University of Iowa; 1943, M.S. Organic Chemistry, Purdue University; 1950, Ph.D. Physical Chemistry, Iowa State University) My academic work was interrupted by service in the United States Air Corps. After an intensive nine months training in Meteorology at the University of Chicago, I served as a Weather Officer in Sioux City, Iowa and Pratt, Kansas. I resumed graduate studies at Iowa State, majoring in physical chemistry, and worked at the Ames Laboratory of the Atomic Energy Commission. I did thesis work in emission spectroscopy. I joined the Babcock & Wilcox Company at their Research Center in Alliance, Ohio, working there for 17 years. I set up an Emission and X-ray Spectroscopy and Mass Spectrometry Laboratory, where I developed all of the analytical techniques for analyzing a broad range of ferrous metals, nuclear and fossil fuels, and liquid metals. As the only Ph.D. chemist, I was assigned various projects involving theoretical and experimental investigations of coal-ash corrosion, thermodynamic calculations of combustion products, and molten salt reactions. I joined Applied Research Laboratories, Glendale, California, as a Manager of their Methods and Applications Division. This position included the development of methods and demonstrations of their entire product line of optical emission and X-ray spectrometers, electron probe/scanning microscopes, and ion probe mass spectrometers. I joined the Environmental Protection Agency Research Laboratory in Athens, Georgia as a Section Leader in charge of an instrumental analysis section that included optical and X-ray Spectroscopy and, employing the nuclear reactor at Georgia Tech, neutron activation analysis. Setting up a transmission electron microscopy laboratory, my major project was to develop and write a method for the identification and measurement of asbestos. I served as Chief, Analytical Chemistry Branch, from 1978 until I retired in 1985. The mission of this branch was to develop methods for the identification and measurement of all pollutants, organic and inorganic, in water supplies.

John **Buzzell** (1955, Ph.D. Physical Chemistry) After completing his Ph. D. with Prof. Charles **Tanford**, John Buzzell joined DuPont Photo Products Dept. in Parlin, New Jersey as a Research Chemist. He was promoted to Senior Research Chemist in 1968 and transferred to the Photo Products Lab in Towanda, Pennsylvania in 1973. He retired from DuPont in 1985. In addition to his chemical career, John coached an age group swim team for 13 years (1975-1988). He moved to State College, Pennsylvania in 1989 and returned to a college town environment. Since 1992 he has been active in the Pennsylvania Forest Stewardship Program. He has also taught sailing at the Lake Glendale sailing camp since 1990. He moved to Foxdale Village in State College in 1998 and has three children and five grandchildren. (Editorial note: We recently "rediscovered" photo negatives of the 1953 building fire generously sent to us by John back in 1991. Thank you for the valuable contribution to our visual history!)

Jules V. **Hallum** (1952, Ph.D. Organic Chemistry) After leaving Iowa, where I had the privilege to study with Stan **Wawzonek**, I went to Minnesota as a postdoc with Fred Koelsali. I took a second postdoc with E. Campaigne at Indiana. I then went to Mellon Institute in Pittsburgh. I found that my C particles were the same size as viruses, so I tried some of my systems with viruses. In 1961, I went to Princeton, New Jersey as head of pioneering research for Columbus Carbon. After two years, I was invited to come to Pittsburgh Medical School to apply my techniques to viruses. In 1969, I went to Tulane Medical School in New Orleans as an Associate Professor of Microbiology. After two and a half years, I was invited to go to the University of Oregon Medical School as Prof. and Head of the Department of Microbiology and Immunology, a position I held for 16 years. Upon my retirement, I was asked by NIH to come to Bethesda to be the first permanent director of the Office of Scientific Integrity. I agreed, but promised only to stay for two years. After two and a half years I retired again to move to Connecticut where I now am doing some writing. I have had a wonderful and fun-filled career.

Richard A **Johnsten** (1960, B.A. Chemistry) After 22 years in the United States Air Force, I returned to college at the University of Great Falls to acquire necessary teaching credentials and subsequently taught high school chemistry until 1992, when I retired.

Siobhan **Malany** (1997, Ph.D. Chemistry) I ventured out to Southern California after defending my Ph.D. thesis to undertake a three-year postdoctoral fellowship in Pharmacology at the University of California, San Diego. Some of the highlights of my San Diego experience have been completing the Markleeville Death Bike Ride in the High Sierras and summiting Mt. Whitney. I am embarking overseas to conduct research at the Max Plank Institute for Brain Research in Frankfurt, Germany. I have two years of funding to work in the Neurochemistry Department. I'm most excited about

combining my Chemistry Ph.D. with the pharmacology/molecular biology techniques that I have acquired through my postdoctoral experience.

Ross Jay **Miller** (1940, B.S. Chemistry)

Ross Miller worked for the DuPont Co. for 40 years with no absence for sickness (June 1940 to June 1980)! He conducted research for the explosives department, which had several name changes, and his work resulted in thirteen patents on military and commercial devices. His last position was as a research associate.

David **Naffziger** (1972, M.S. Chemistry)

My present position is Senior Research Scientist at Whitmire MicroGen Research Laboratories.

Note From the Editors

Our department continues to change and grow in exciting directions. We hope this newsletter gives you a sense of how well your old alma mater is faring these days. While we only publish once a year, our web site is updated frequently with news and announcements, so please look us up at www.uiowa.edu/~chemdept/. We gratefully thank Michele **Gerot** and Sharon **Robertson** for their assistance with this newsletter, our faculty colleagues for their contributions to content, and Janet **McCune** for final proofreading.

Dwight Tardy and Ed Gillan

Research Tools for the New Millennium and Images From Our Archives



New Nonius Kappa CCD X-ray diffractometer (see feature story on page 6)



Our first working NMR – a Varian A-60 MHz (c. 1965)



Our new Bruker 400 MHz NMR with pulse-gradients



New Finnigan LCQ DECA tandem (MS-MS) mass spectrometer with an ion trap and capability to select and analyze fragments from the parent ion.



Iowa Chemistry supports the war effort by training new recruits in chemistry (ASTP program, 1943)