

IU · CHEMISTRY

Life in an RNA World

by Donald H. Burke, Assistant Professor of Chemistry

Donald Burke joined the chemistry department as an assistant professor after receiving a PhD at the University of California, Berkeley, and postdoctoral studies at the University of Colorado. We are indebted to him for this summary of the ongoing efforts in his and others' laboratories in this exciting research area.

The Editors

RNA-based life? It is the sort of thing they might have used on Star Trek, if they could have found a way to work it into the plot. They had creatures made from gigantic crystals, swarms of microscopic robots with a collective consciousness, and creatures that floated through outer space. Vulcan biochemistry was different enough that it used copper in place of iron to carry oxygen. Why not a cellular life form devoid of proteins, that used RNA molecules to perform catalysis and maintain genetic information? For the most part, if a macromolecule is doing work in a cell here on earth, that molecule is a protein, with a few notable, but isolated exceptions. Does it have to be that way? Can RNA replace proteins or even repair metabolic damage wrought by proteins that misbehave? The question lies at the heart of some avenues of biomedical and microbial engineering, and the answer may reveal much about the earliest forms of life on earth.

The last four decades have seen a steady shift in the perception of RNA's role in biology. By 1960, it was well established that RNA can act as a passive intermediate in the flow of genetic information from DNA to proteins (mRNA), as a carrier of amino acids (tRNA), or as the principal component of ribosomes (rRNA). By 1970, there were proposals from Leslie Orgel, Carl Woese, and Francis Crick that the earliest life forms may have used RNA both as their carrier of genetic information and as their principal catalytic molecule. This seemed to solve the "chicken -and-egg" problem ("Which type of macromolecule proteins coded by DNA or DNA that is inert without proteins did Chemistry have to invent first on the path to making Life?"), but it was experimentally void. That picture began to change in the early 1980s with the Nobel Prize-winning discovery by Tom Cech, Sidney Altman, Norman Pace, and others, of natural catalytic RNAs (ribozymes) that make, break, or exchange phosphoester bonds. In the 1990s, Larry Gold, Jack Szostak, and others introduced in vitro selection of new RNAs from random-sequence populations based on their intrinsic functions. This work has shown that some RNAs, known as aptamers, can fold into exquisite shapes with great affinity and high specificity for hundreds of targets, while other RNAs catalyze one or more of a few dozen reactions. Then just this year, in a crystallographic tour-de-force, the catalytic center of the ribosome, that protein-synthesizing machine so fundamental to all life, was shown to be built entirely from RNA, with no protein components near enough to participate directly in the chemistry.

Now the questions have changed. Instead of asking *whether* RNA can behave catalytically, the questions are *how well* it can perform its catalysis, *what range of reactions* it can catalyze, how new functions *evolve*, and how RNA sequence and structure contribute to how ribozymes *work*. Instead of asking *whether* artificial aptamers and ribozymes can participate in biology, the goals are to use them to develop treatments for cancer and infectious ailments, to engineer microbes to clean up environmental toxins, and to model the "ribo-organisms" postulated by Orgel, Woese, and Crick.

Since I joined the faculty of the IU Department of Chemistry in 1998, I've led a bustling young group of scientists eager to answer some of these questions. Their work is aimed

In this issue we present a series of articles describing three different aspects of our diverse field.

Donald Burke discusses the work being done in biochemistry with RNA.

Gary Wiggins explains how the new discipline of informatics is assisting in the management of data in chemistry.

We also tell you about the new Indiana instrumentation Institute, an alliance between IU and Purdue.

For more information, contact the chemistry department or visit our Web site.

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RNA World

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encouraged me to form a similar center at IU. And why not? An understanding of how life has evolved on Earth is central to any discussion of life elsewhere, and the IU researcher community has long been an international leader in addressing questions of how life originated and evolved on Earth.

My undergraduate students picked up on my interest in bringing astrobiology to IU, and, in an unexpected gesture, one even took to calling me "Mr. NASA."

However, the official announcement of the second round of competitions for new Astrobiology Centers made it clear that funding priorities had changed. NASA was returning to mission-related science, at the expense of the biochemical and microbiological focus that had dominated the first round of competitions. IU would not be submitting an astrobiology proposal this time. The amount of effort it would have taken to generate a proposal, which would have been a long-shot at best, made it an easy decision.

Forming the Center for Early and Extreme Evolution at IU

The organizational efforts were not wasted, however. The five IU faculty members originally involved in the astrobiology effort Burke from chemistry, Lisa Pratt from geology, and Jeff Palmer, Rudy Raff, and Cheng Kao from biology formed the new Center for Early and Extreme Evolution (<http://ernie.chem.indiana.edu/celf>).

The first goal of the CEEE is to promote research in all aspects of the origin and early evolution of life, which is an integral part of each of these faculty members' research programs. Collectively, the group asks such questions as, "How do replicating polymers give rise to integrated metabolisms and cells? How do interactions among simple cells lead to the formation of new, more complex kinds of cells? How do complex single-celled organisms become still more complex multicellular organisms? What can the rock record tell us of the history of biochemistry and morphology? How constrained are the circumstances that have guided the evolutionary history of life on earth?"

The second goal is to establish a true "critical mass" of researchers with expertise in these areas, in part by helping to recruit outstanding students, postdocs and faculty interested in doing research in these areas. The third goal is to communicate advances in evolutionary sciences to the public and to the University community.

at identifying new functions for RNA and DNA molecules, understanding how these RNAs accomplish their varied tasks, and determining the effect of these RNAs on biological processes of living cells. There is a medical side to this work, funded by the NIH, that focuses on developing new treatments for cancer and viral infections. The Burke lab is developing ways to inhibit the cell-to-cell communication that helps cancer cells spread, and using aptamers to deliver toxins such as boron (for boron neutron capture therapy, BNCT) specifically to cancer cells. We are using aptamers that inhibit HIV growth to evaluate the virus's ability to evolve resistance to aptamer inhibition. The lab also has a deep interest in catalysis and substrate binding by RNA and single-stranded DNA. This latter work has implications for models of the origin and early evolution of life, and it has led to establishment of a new center at IU dedicated to studies of large-scale evolutionary processes.

Astrobiology comes of age

While a postdoc with Gold at the University of Colorado in Boulder, my origin-of-life interests led me to CU geologist and astronomer Bruce Jakosky, who studies evidence of past and present water on Mars. Jakosky was building a coalition of scientists to form an Astrobiology Center at CU, and I was invited to help organize the effort. It was exciting to be in the thick of things during the formation of what has since become a nationally recognized astrobiology center.

As part of its new mission to identify habitable worlds other than our own, NASA is organizing centers for its Astrobiology Institute. NASA defines astrobiology this way: "Astrobiology is the study of the origin, evolution, distribution, and destiny of life in the universe. It uses multiple scientific disciplines and space technologies to address fundamental questions: How does life begin and develop? Does life exist elsewhere in the universe? What is life's future on Earth and beyond?" These questions are age-old. But now, for the first time in human history, advances in the biological sciences, space exploration, and space technology make it possible for us to answer them. With such lofty aims, the specific scientific goals and objectives of the Astrobiology Institute naturally cut across the boundaries of traditional disciplines, such as astronomy, geology, chemistry, and biology.

When Jakosky's center was funded at CU, he encouraged me to form a similar center at IU. And why not? An understanding of how life has evolved on Earth is central to any discussion of life elsewhere, and the IU researcher community has long been an international leader in addressing questions of how life originated and evolved on Earth.

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The formal activities of the center emphasize this last point. For example, an award from the IU dean of faculties supports a symposium series on "Early and Extreme Life." Last spring, the first speaker in that series, David DesMarais, of NASA Ames Research Center, explained to a crowd of 140 NASA's role in trying to understand how life might arise on planets outside our solar system. He also pointed out how Earth life has influenced this planet's chemistry and geology, and how advances in these areas are guiding the search for habitable planets. Several undergraduate students in the audience were fascinated by DesMarais's presentation and peppered him with questions ranging from theology to terraforming Mars.

This fall the series will host David Bartel, a world-renowned leader in RNA biochemical research from the Whitehead Institute at MIT, and additional speakers are planned for the future.

RNALife workshop planned

But the big plans for CEEE are in store for next year, when it will host what we hope will be the first in a series of international workshops on Early and Extreme Evolution. The first workshop, titled "RNALife," is organized around a single question: "How viable is life based on RNA catalysis?" The workshop will include presentations in three areas:

- *Fundamental nucleic acid biochemistry in vitro.* Modern organisms use an astounding array of biocatalysts mostly protein enzymes to grow and proliferate using the chemical energy of their surroundings. Do RNA enzymes have what it takes to fulfill this role? In recent years there have been rapid advances in this area that are beginning to define the chemical limits of RNA catalysis.
- *Applications of engineered nucleic acids inside cells.* What happens to a cell when its survival depends on ribozymes and aptamers? What are the biological constraints to RNA-based life? RNAs and modified polynucleotides developed through in vitro manipulations have been used to rescue transgenic animals with genetic deficiencies, to reveal aspects of basic biology, and biomedically to kill viruses and pathologi



Donald Burke

cal cells. The potential here has captured the attention of several pharmaceutical companies.

• *Comparative genomics.* If life as we know it evolved from within a metabolically complex RNA world, some of the structural RNAs from that era may still lurk within the non-protein-encoding regions of extant genomes. Comparative genomics has already provided extraordinary insights into the nature of the earliest protein/DNA-based organisms, and it has allowed the identification of several highly conserved transcripts of unknown function that do not encode proteins. Some of these transcripts may even serve as ribozymes for essential biochemical reactions.

So the questions proliferate for the Center for Early and Extreme Evolution as well as for the Burke lab: Can an organism make a living without using proteins? Perhaps *we are* the very RNA-based life whose plausibility we seek to determine. Spock would find it fascinating.

Further information on the Center for Early and Extreme Evolution can be found at

<http://ernie.chem.indiana.edu/celf>.

Chemical Informatics Flourishes at IU by Gary Wiggins

The size of the information problem in chemistry is staggering. It can be judged from the fact that Chemical Abstracts Service adds more than 700,000 new compounds to its database annually. Massive amounts of physical and chemical property data are generated each year for new and existing chemical substances. Such an avalanche of data can bury a chemical research project unless ways can be found to cope with it. Fortunately, those trained in chemical informatics can provide tools to acquire, organize, and evaluate data and those tools can yield new insights for further chemical research.

Chemical informatics companies combine molecular simulation and data analysis techniques with high-quality graphical visualization to obtain stunning results. Chemical informatics thus helps chemists investigate new problems and organize and analyze scientific data to develop novel compounds, materials, and processes through the application of information technology. Beginning next fall, students on the Bloomington and Indianapolis campuses of Indiana University will have the opportunity to gain training in chemical informatics in new undergraduate and graduate programs in the School of Informatics.

The curriculum, developed jointly by IUB and IUPUI, educates students in the following major aspects of chemical informatics:

- **Information Acquisition:** Methods used for generating and collecting data empirically (experimentation) or from theory (molecular simulation)
- **Information Management:** Storage and retrieval of information
- **Information Use:** Data analysis, correlation, and application to problems in the chemical and biochemical sciences.

Information Acquisition

Information acquisition is highly dependent on the computer today. With the integration of modern sensors into chemical instrumentation, the volume of data that can be generated is enormous. Future instrumentation will incorporate information from existing chemical databases, employ modeling techniques, and analyze experimental data as they are generated. Such "smart instruments" will significantly improve the ability of the user to make intelligent decisions about the course of an experiment while the data are being collected and analyzed.

There now exist two complementary pathways for generating and collecting information in the chemical sciences: by experimentation and by computer simulation. Traditionally, the gathering of data from experiments was done manually, but with the development of computers small enough to be purchased by individual laboratories, the phrase "computers in chemistry" arose to describe their use. Several decades ago this expression meant interfacing a computer to an experiment like a spectrometer or a chromatograph and collecting the data in real time for storage and later manipulation. While this is still being done with microprocessors built into the instruments themselves, a more encompassing term now commonly used is "computational chemistry."

Computational chemistry seeks to predict quantitatively molecular and biomolecular structures, properties, and reactivity by computational methods alone. It uses modern chemical theory to predict the speed of unknown reactions and the synthetic sequences by which complex new molecules can be made most efficiently. Computational chemistry allows chemists to explore how things work at the atomic and molecular levels and to draw conclusions that are impossible to reach by experimentation alone. Thus, computational chemistry supplements experimentally derived data.

One aspect of computational chemistry is molecular modeling. Molecular modeling involves the investigation of three-dimensional molecular structures using classical and quantum mechanical methods assisted by computer graphics. Other molecular modeling techniques include quantitative structure-property relationships, which find applications in structure-based drug design, similarity searching, and molecular shape prediction. Molecular modeling techniques are utilized extensively in pharmaceutical research, especially to predict pharmacophores, the structural features of molecules required for particular biological activities. Molecular modeling is now used routinely to generate data concern



Gary Wiggins

ing energetics, dynamics, and other information at the molecular scale that is not amenable to experimentation.

Recent advances in combinatorial synthesis and high throughput screening technologies now allow for preparation and analysis of hundreds of thousands of molecules (by a single company!) yearly. Combinatorial chemistry techniques grew out of several disciplines, including organic, medicinal, and physical chemistry, engineering and robotics, computational chemistry, informatics, and screening technology. Robotics as used in combinatorial chemistry provides the drug industry a powerful tool with which to screen millions of potential compounds in a fraction of the time it would have taken to evaluate even a few dozen compounds a decade ago. Now widely employed in the pharmaceutical area, combinatorial chemistry has begun to find applications in materials science. Because so much information is being generated and collected from combinatorial technologies, there is a concomitant problem associated with storing and retrieving those data. That problem is now being addressed by those skilled in chemical informatics.

Information Management

Many of the applications for storing and retrieving chemical data have grown out of the rapid developments in chemical structure coding and searching. The advances in structure-based applications have led to integrated chemical information systems more and more of which have Web interfaces and to specialized applications such as Laboratory Information Management Systems. The ability to search large secondary databases, such as Chemical Abstracts or Medline, easily and precisely and to move seamlessly back and forth between the original primary journal literature and the abstracting and indexing databases is one of the truly great achievements of modern chemical informatics research.

Chemists have developed their own communication system (chemical nomenclature and structure systems) that adds a unique dimension to informatics. There is a confluence of activities in chemical informatics that is centered on the chemical structure (both 2-D and 3-D depictions). Two-dimensional chemical structural databases have evolved from traditional chemical structure diagrams into structure searching and substructure searching systems. In the late 1980s, attention turned to 3-D structure searching and representations of chemical structures in three dimensions. Recently, techniques for the full description of the conformational space of flexible molecules and similarity searching techniques have been discovered. These are now being incorporated into chemical information storage and retrieval systems.

Information Use

The computer has enabled chemists to analyze and correlate data from massive chemical and biochemical databanks, and when coupled with chemical visualization and modeling techniques, it is revolutionizing chemical research. Informatics techniques help create an integrated information environment in which all aspects of chemical research and development can be dealt with in a unified system. Not only can chemical structures be used as search keys in such systems, but also unknown properties and spectra can be predicted using chemical informatics tools and techniques that draw on the existing knowledge base of chemistry. Data mining has emerged as a significant factor in the reassessment of data collected over time in an organization. Chemists can now access decades of raw data stored in disparate formats and obtain useful results to build on the research that has taken place in past years.

Bioinformatics

Bioinformatics has emerged at the intersection of molecular and computational biology. In bioinformatics, algorithms are developed to analyze, interpret, and predict data and to assist in the design of experiments in the biosciences. On the structural front, much attention is being given to the determination of the primary, secondary, and tertiary structures of biomolecules. Research in bioinformatics is directed toward the development and application of computer systems and computational methods for

- Management, retrieval, analysis, and interpretation of data obtained in biological experiments;
- Prediction of unknown relationships with respect to structure, function, and evolution of genes, proteins, cells, organisms, and populations; and
- Design of new experiments.

Chemical informatics and bioinformatics offer opportunities

In addition to chemical informatics, the IU School of Informatics offers a master of science in bioinformatics. Why study these related disciplines in the Indiana University School of Informatics?

The development of future chemical informatics systems will require a workforce with a solid grounding in chemistry and an expert grasp of the available computer technology. Chemical, agrochemical, pharmaceutical, and biotechnology companies are in great need of people with extensive knowledge of chemistry and the computer skills to handle the data generated by chemical researchers. Companies involved in medical, environmental, and chemical instrumentation will increasingly depend on chemical informatics in order to be successful competitors. In addition, database producers, chemical software developers, and those in the primary and secondary chemical publishing areas offer attractive opportunities for graduates of the chemical informatics program.

The innovative services and databases offered by the IU libraries, the advanced instrumentation facilities (including the recently established Linda and Jack Gill Center for Instrumentation and Measurement Science at IUB), a history of nontraditional information services (for example, the Quantum Chemistry Program Exchange), and the Computational Molecular Science Facility at IUPUI all combine to make Indiana University the perfect place to pursue a graduate program in chemical informatics.

The chemistry departments at IUB and IUPUI are both known for their strengths in computational chemistry and chemical informatics. Silicon Graphics high-end workstations and high-performance servers at both IUB and IUPUI are used to render molecular graphics, conduct computational studies, and interface numerous databases, including the Cambridge Structural Database and the Protein Data Bank. Both IU sites have access to the CrossFire system for searching the Beilstein and Gmelin databases. The SciFinder Scholar program for searching the databases of Chemical Abstracts Service is also provided at both locations 24 hours per day.

In recent years, world-renowned experts in chemical informatics have assisted in our design of a chemical informatics curriculum that is second to none in the world. In addition, input from potential employers in the chemical and pharmaceutical industries has helped shape the curriculum. To prepare students to develop innovative chemical informatics solutions, the IU chemical informatics curriculum covers these areas:

- Software tools,
- Basic molecular modeling,
- Laboratory information management systems,
- Database management tools,
- Chemical database systems (including spectral and reaction systems),
- Statistics and chemometrics,
- Laboratory automation and instrument interfacing,
- Automated synthesis,
- High throughput screening,
- High-performance computing tools and their role in chemical research,
- Structure coding systems (including nomenclature),
- Electronic chemical publishing systems, and
- Chemical patent information sources.

Chemistry faculty at both IUB and IUPUI will teach the chemical informatics courses collaboratively. In addition, adjunct faculty and guest lecturers from industrial settings with specific expertise in selected topics of chemical informatics will enhance the curriculum through distance education lectures.

The success of the program is ensured by the participation of such noted IUB/IUPUI faculty as **Joseph Gajewski** and **Kevin Gilbert** (of PCModel fame), at IUB; **Donald Boyd** and **Kenny Lipkowitz**, editors of *Reviews in Computational Chemistry*, at IUPUI; and bioinformatician **Donald Gilbert** at IUB. **George W.A. (Bill) Milne**, editor of the *Journal of Chemical Information and Computer Sciences*, has been appointed adjunct professor of chemistry at IU for 2000-2002, and **John M. Barnard**, of Barnard Chemical Information Ltd., holds an adjunct professorship in the Department of Computer Science. Lending support to the instructional effort as visiting lecturers are such experts as **Guenter Grethe** (MDL) for reaction databases and **Richard Lysakowski** (CENSA) for laboratory information management systems. In addition discussions are under way to develop cooperative activities with the premier chemical informatics program in Europe, that of Professor **Peter Willett** at the University of Sheffield. The development of future chemical informatics systems will require a workforce with a solid grounding in chemistry and an expert grasp of the available computer technology. Chemical, agrochemical, pharmaceutical, and biotechnology companies are in great need of people with extensive knowledge of chemistry and the computer skills to handle the data generated by chemical researchers. Companies involved in medical, environmental, and chemical instrumentation will increasingly depend on chemical informatics in order to be successful competitors. In addition, database producers, chemical software developers, and those in the primary and secondary chemical publishing areas offer attractive opportunities for graduates of the chemical informatics program.

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Indiana Instrumentation Institute Unites IU, Purdue

cheaper, better. The ivory towers are now open to the commercial world. Both sides acknowledge that they need each other far more than before."

Initial III projects will include development of high throughput mass spectrometers, new methods of separation and analysis of protein mixtures to take advantage of the genomics revolution and make it of practical benefit, new laser-based techniques for differentiating malignant from benign cells, the development of fiber-optic sensors, and the conception of novel sources for mass spectrometry.

The institute is establishing strong relationships with high-tech industry in Indiana and is committed to assisting graduate students and others in founding start-up companies based on research work done at Purdue and IU. A new program, established at IU in the area of instrumentation science, is expected to be of benefit in training students to enter the high-tech workforce, in providing excellent staff for existing Indiana firms, and in re-educating those already employed.

Gary Hieftje of IU says: "The timing for III is perfect. We have great measurement challenges associated with the fusion of biology and chemistry. The state of Indiana has recognized how important this topic is to economic development and in providing opportunities for students. This is a wonderful opportunity for symbiosis: We need industry insights and industry needs new ideas and talented people."

Thanks to Gary Hieftje, Distinguished Professor of Chemistry, for providing the description of this new and exciting collaborative project.

Recognizing the long-standing strengths in chemical instrumentation and analytical chemistry at both Indiana University and Purdue University, a collaborative institute called the Indiana Instrumentation Institute (III) has been formed to unite the talents of faculty, students, and technical staff at both institutions. Through a formal arrangement that involves the chemistry departments at both institutions, the Linda and Jack Gill Center for Instrumentation and Measurement Science at IU, and the Purdue Center for Advanced Instrumentation, the participants will collaborate on research projects and education and will develop relationships with industries involved in chemical measurements.

Further improvement in the instrumentation infrastructure at each university is planned. The III has received funding from the Indiana 21st Century Fund and includes Eli Lilly & Co. and Bioanalytical Systems as corporate partners.

Peter Kissinger, Purdue faculty member and CEO of BAS says: "It is fabulous to see this come to fruition. For 30 years or more, Indiana has been at the forefront of technical developments in this field. While we compete on the basketball court, we are friends in our laboratories advancing measurement science. Many of the key tools of modern drug development (for example, liquid chromatography and mass spectrometry) have evolved out of basic work at IU and Purdue since 1970. Both schools are still setting the pace. The III brings together those needing data with those innovating on how to obtain it faster,





Chemistry alumni are specially invited to join with other IU alumni in returning to the classroom for a weeklong series of classes on topics ranging from the arts and sciences to politics and global affairs.

June 17-22

For more information, please contact (800) 824-3044 ; iualumni@indiana.edu; www.alumni.indiana.edu. Sponsored by the Division of Continuing Studies and the Indiana University Alumni Association. Phyllis Taylor, School of Continuing Studies



chair's letter

Building now for the department's future

The chemistry department is in the rare position of having the opportunity to significantly change directions and build for the future. Plans are being made on campus for a new multidisciplinary science building, and we have authorization for a large number of new faculty hires in the coming years. If we use this opportunity wisely, we should still be one of the leading chemistry departments a decade from now.

The new science building will be the highest priority in the university's request to the state legislature this year. It will be designed to facilitate inter- and multidisciplinary research. Likely occupants include the Gill Center and several of our biochemists. Some of our hires in the coming years will be made with this building in mind. Alumni support in the political process of getting this funded by the state is important.

We are pleased to announce that Professor **P. Andrew Evans** has agreed to join us from the University of Delaware. Evans is a synthetic organic chemist with interests in both synthetic methodology and natural product synthesis. His recent work is focused on acylradical cyclizations and rhodium catalyzed alkylations.

Although we hope to hire several more faculty this year, the opportunity comes with some pain. During the past few years a number of senior faculty have resigned to take jobs elsewhere. In addition, last year **Lee Todd** and **George Ewing** retired. Several additional retirements are expected this year.

On the other hand, within the existing faculty there were a number of promotions last year. **Shuming Nie**, **Glenn Martyna**, and **David Clemmer** were promoted to associate professor with tenure. Clemmer also received money from the university for purchase of a Fourier transform mass spectrometer. This will be a major addition to his research effort and to the department's capability in mass spectrometry.

Additionally, **George Christou** was promoted to the Earl Blough Professorship. The Blough Professorship was made possible through the generous bequest of **Earl Blough** (1876-1971), BA 1899, LLD'31. His activities as chemist and metallurgist, inventor, and administrator were of profound importance for the development of the aluminum industry and gained him an international reputation. His accomplishments honor his alma mater and serve as worthy goals for our students.

Gary Hieftje was named to a Robert and Marjorie Mann Chair. This was made possible through the generosity of Robert (BS'45) and Marjorie (BS'43) Mann. In 1949, Bob joined Eli Lilly in biochemical research and spent his career progressing through several executive management positions until his retirement in 1983. Marjorie was a Lilly chemist for several years as well.

Milos Novotny was given the Lilly Chemistry Alumni Chair. This chair was created from donations to the Lilly Alumni Endowment, established by Lilly employees. Further donations to that fund will continue to be used to develop the department. If the fund grows large enough it could fund a second chair. Novotny has also received permission from the IU Board of Trustees to set up the Institute for Pheromone Research. The institute's mission is to foster interdisciplinary research activities in the field of chemical communication and the broader aspects of chemical ecology. At present, four IU faculty members (from the departments of Chemistry, Biochemistry/Medical School, and Psychology) collaborate with Professor Novotny's group on various aspects of mammalian pheromones. Outside collaborators reside at Rockefeller University, Harvard University, University of Chicago, University of Maryland, and Georgia Tech.

There also have been a number of changes in the scientist and professional ranks. **Bill and Kirsten Streib** have retired after exemplary service in the crystallography facilities (see page 11). **John Bollinger** will now assume more responsibility in this area. **Marty Pagel** resigned as director of NMR, molecular modeling and visualization, and information technology to take a position at Monsanto in St. Louis. **Ulrike Werner-Zwanziger** will continue to manage the NMR facility. **John Tomaszewski**, who recently completed his PhD degree at the University of Washington, has been hired to help in NMR. He will soon be joined by **Xinfeng Gao**, who will also have responsibility in molecular modeling and visualization.



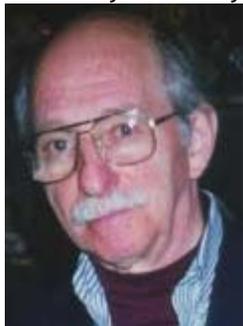
Ernest Davidson
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works of Hydrogen Bonds: DFT and Polarizable Force Fields." The Computational Chemistry Series has been under the sponsorship of the Quantum Chemistry Program Exchange.

S. Walter Englander gave the Harry G. Day Lecture on "How Proteins Fold: The Intermediates and the Barriers," on Nov. 10, 1999. Englander is the Jacob Gershon-Cohen Professor of Medical Science at the University of Pennsylvania, Philadelphia. He is a member of the National Academy of Sciences and an honorary fellow of the American Association for the Advancement of Science.

"Molecule-Specific Imaging with Mass Spectrometry-from Combinatorial Chemistry to Biological Cells" was the title of the Eli Lilly Distinguished Lecture by **Nicholas Winograd**, given on Dec. 8, 1999. Winograd is the Evan Pugh Professor in the Department of Chemistry at Pennsylvania State University. He is a fellow of the American Association for



lectures &

presentations

The Department of Chemistry has a long tradition of bringing outstanding scientists to the campus to visit and to give lectures. Among the various sponsoring programs that make this possible is the Distinguished Lecture Series. The department's Colloquium

Committee arranges the visits, which are funded by the income from the respective lectureships. The lectureships have been established in turn, by the contributions of former students, colleagues, and friends and by interested and supportive organizations. During the past year, nine such lectures were presented.

The Distinguished Lecture in Computational Chemistry was presented by **Dennis R. Salahub** on Oct. 13, 1999. Salahub is the director general of the Steacie Institute for Molecular Sciences, National Research Council of Canada, in Ottawa. His subject was "Net

S. Walter Englander



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Chair's letter

(continued from page 8)

in recognition of classroom excellence. Each faculty member in the department was ranked numerically based on teaching contributions. Courses taught, course enrollments, and student evaluations provided the principal information. Additional awards are listed in Faculty News (see page 17).

The past year has been turbulent. **Gary Hieftje** resigned from the departmental chair position to devote full time to other endeavors. **Jack Crandall** served as acting chair for a few months, and then I acted as chair from January until July. Finally in July, I agreed to serve as chair for two years. After the hires anticipated during the next two years, I hope to pass the leadership of the department smoothly to our younger faculty.

Meanwhile, the support of our alumni is crucial. Contributions from alumni have been used during the past year to supplement faculty recruitment, biochemistry laboratory course development, and graduate student recruitment. Without these vital funds we would not be able to move ahead. I am thankful for these donations.

Ernest Davidson

It is my pleasure to acknowledge two outstanding gifts to the Department of Chemistry, both of which will exist in perpetuity and were established to support graduate and undergraduate students needing financial assistance. **Andrew Loh**, BS'71, has established the Andrew Loh Scholarship in Analytical Chemistry, and **Richard F. Slagle**, BA'27, through an estate gift, has established the Slagle Fellowship.

Many of our faculty have received major IU and national awards since our last newsletter. **Victor Viola** was the recipient of the **2000 Tracey M. Sonneborn Award**. This award is given to faculty members who have achieved local, national, and international distinction in both teaching and research/creative activity and their interaction. Vic presented the Sonneborn Lecture in the Whittenburger Auditorium on Dec. 5. Last April, six of our faculty **George Christou**, **Martha Oakley**, **Dennis Peters**, **Theodore Widlanski**, **David Williams**, and **Jeffrey Zaleski** received Teaching Excellence Recognition Awards, which were established by the IU Board of Trustees

Nicholas Winograd

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Institute of Technology. His subject was "Advances in Drug Delivery and Tissue Engineering." Langer has received more than 70 major awards. He is the only active member of all three U.S. national academies.

The inaugural V.J. Shiner Jr. Lecture brought to campus **Vern L. Schramm**, the Ruth Merns Chair in Biochemistry at the Albert Einstein College of Medicine, Yeshiva University, Bronx, N.Y.. On April 19, he discussed "Enzymatic Transition States and Transition State Inhibitors Some Chemistry, Structure, and Biochemistry." Schramm is an elected fellow of the American Association for the Advancement of Science and is the 1999 foreign Rudi Lemberg awardee of the Australian Academy of Science.

Several special lectures, seminars, and colloquia were also held during the past year:

A joint colloquium with the physics department was held on Dec. 1, 1999. The speaker was Professor **John S. Wettlaufer** of the Department of Physics at the University of Washington, Seattle.

The Southern Indiana Section of the American Chemical Society provided three lecture programs: **Wolfgang Bertsch** (University of Alabama) on "Chemical Analysis of Fire Debris in Suspected Arson Cases: Triumphs and Pitfalls," Oct. 13, 1999; **Kelly Zaleski** (Cook Imaging Inc., Bloomington) on "Cook Imaging/Cook Pharmaceuticals: Who, What, Where Are We"; and **Carolyn Fisher** (McCormick and Co.) on "Spices and Herbs: Chemistry and Health," March 15.



the Advancement of Science and has received numerous awards for his work in the area of surface phenomena.

A Parke-Davis Distinguished Lecture was given by **Amos B. Smith III**, Rhodes-Thompson Professor of Chemistry at the University of Pennsylvania and a member of the Monell Chemical Senses Center and of the Laboratory for Research on the Structure of Matter. On March 8, he spoke on "The Total Synthesis of (-)- Penitrem D: An Architecturally Challenging Synthetic Target." He has served on the editorial boards and as editor of numerous scientific journals. Among his many awards are the Ernest Guenther (ACS, 1993) and the Creativity in Organic Chemistry (ACS, 1997).

The DuPont Distinguished Lecture, held on March 22, on "Capillary Gas Chromatography Towards the Next Millennium" was authored by Professor **Pat J. Sandra**. He holds several faculty and executive positions in universities and institutes in Belgium, the Netherlands, and South Africa. He has received many awards in the area of separation science.

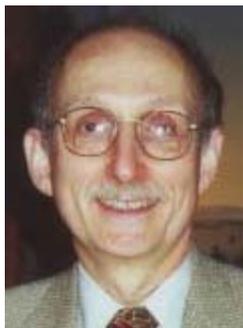
A second Parke-Davis Distinguished Lecture was presented by Professor **Lanny S. Liebeskind** on March 29. He discussed "Bioorganic Organosulfur Chemistry: From Nickel-containing Enzymes to New Synthetic Methods." Liebeskind is the Samuel Candler Dobbs Professor, chair of chemistry, and director of the Faculty Science Council at Emory University, Atlanta. He is the editor of *Advances in Metal-Organic Chemistry* (JAI Press) as well as associate editor of the journal *Organometallics* (ACS).

Brian M. Hoffman, professor of chemistry at Northwestern University in Evanston, Ill., was the Raymond Siedle Lecturer this year. On April 5, he reviewed "ENDOR Spectroscopy and Oxygen Activation by Metalloenzymes." Hoffman is a member of the editorial advisory board of the *Journal of the American Chemical Society* and the editorial board of the *Journal of Bioinorganic Chemistry*. He has received many awards in the field of inorganic chemistry.

In 1974, the Frank T. Gucker Lectureship in Chemistry was established by his friends, colleagues, and relatives. The 19th lecture in this series was presented on April 12 by **Robert S. Langer**, the Kenneth J. Germeshausen Professor of Chemical and Biomedical Engineering at Massachusetts

Amos B. Smith

Pat J. Sandra



Lanny S. Liebeskind

Brian M. Hoffman



Robert S. Langer

On June 6, the Indiana Section of the Society of Applied Spectroscopy sponsored a seminar by Professor **Evan R. Williams**, of the University of California, Berkley. His subject was "Two-Dimensional Mass Spectroscopy of Biomolecules: Flip Your Ions the 'BIRD'."

As a part of its activities, the Gill Center presented a seminar on "Chemiluminescence Spectroscopy Enchanting Laboratory Curio or Powerful Analytical Tool?" The June 8 speaker was Professor **Neil W. Barnett**, of the School of Biological Sciences, Deakin University, Geelong, Australia.

Max Marsh

Inorganic Mini-Symposium dedicated to retiring Todd

The 11th annual Inorganic Mini-Symposium was held on Oct. 6. This year it was dedicated to the retirement last summer of Professor Lee J. Todd, and all the speakers were alumni of the Todd group. There were six talks: **Dave Hyatt**, PhD'68, "What's a boron chemist like you doing in a place like this?"; **George Bodner**, PhD'72, "The role of representations in inorganic chemistry"; **Allen Siedle**, PhD'73, "Phase transitions in new polypropylene"; **Robin Kump**, PhD'81, "Applying the IU experiences to the next journey of scientific learning: The DuPont career and beyond"; **Timothy Hanusa**, PhD'83, "From carboranes to calcium: exploiting steric effects on structures and reactions"; **Charles Lugar**, BS'91, "Synthesis and evaluation of LY444711: a novel growth hormone

secretagogue."

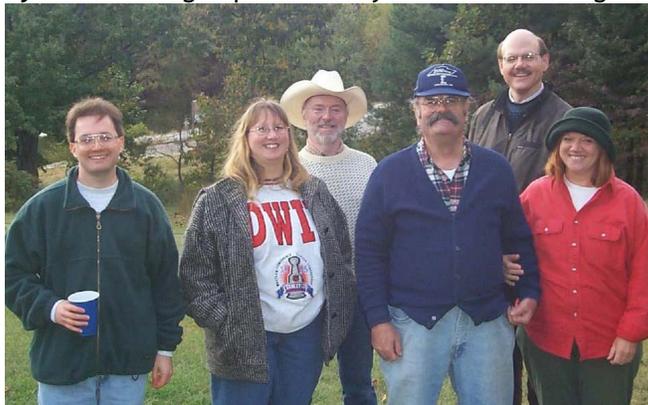
As is customary, the next day was the inorganic picnic at Hardin Ridge, in glorious October sunshine and color.

George Christou

Long-time chemistry pair retires

A significant event in the department was the retirement in May of **Bill and Kirsten Streib** following more than 70 years of combined service to the university and department.

Bill first joined the department as an instructor in 1963, and Kirsten accepted an appointment as a research associate in Professor **Lynn Merritt's** group the same year. In the ensuing



Attending the Inorganic Mini-Symposium picnic are Lee and Marci Todd, front row on far right, along with Todd alumni, from left, Steve Jasper, Kimberly Love, Dave Hyatt, and Tim Hanusa.



Also at the picnic were a number of Christou group alumni: (front row, from left) Ann Schake and Joey Money; (middle row, from left) Norman Dean, Stephanie Castro, Hilary Eppley, Angelica Brown, and Kevin Kolack; (back row, from left) George Christou, Shawn Sendlinger, and Mike Wemple.



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Retiring Bill and Kirsten Streib show off the Chemistry Building to their son Allan and grandson Harrison.

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Isotopic Complexity"; Richard A. Keller, of the Los Alamos National Laboratory. on "Single Molecule Detection in Fluid Solution: Application to DNA Fragment Sizing"; and our own Professor David E. Clemmer on "Developing Ion Mobility-MS Techniques for Analysis of Protein Mixtures."

The Gill Prize, awarded biennially, consists of a trophy, plaque, and cash award of \$10,000.

Max Marsh



years, Bill was promoted to assistant professor and director of laboratories prior to assuming the position as research crystallographer in the IUMSC in 1970.

Kirsten continued to work as a research associate in crystallography, with short breaks when their two sons were born and several stints as an instructor of Germanic languages for the university. She was appointed staff crystallographer in 1979, a position she held until her retirement.

While Kirsten was known for her determination in attacking some truly difficult structures over the years, Bill was the principal developer of the diffractometer control software that allowed the Molecular Structure Center to become recognized as the premier small-molecule crystallography laboratory in the country. Both Bill and Kirsten were involved in developing the unique low temperature techniques that allowed the study of thousands of highly reactive materials. While nearly all laboratories now recognize the importance of these low temperature techniques, a search of all published structural data that have been done at cryogenic temperature reveals that more than 14 percent were completed in the IUMSC.

John Huffman

Gill Prize awarded to Sweedler

The Gill Prize, established by Jack M. Gill and Linda Gill to recognize significant achievements in the fields of instrumentation and measurement science, has been awarded for year 2000 to Professor **Jonathan V. Sweedler**, of the University of Illinois Department of Chemistry .

A special Gill Center Symposium honoring Sweedler was held on the Bloomington campus in the Harry G. Day Lecture Hall in the Chemistry Building on April 29. After introductory comments by Jack Gill, President Myles Brand, and Professor Gary Hieftje, Gill Center director, the award address was presented by Sweedler on the subject "Pushing NMR Spectroscopy into the Nanoliter Volume Regime Using Microcoils."

Other symposium speakers included Professor Robert Lodder, of the University of Kentucky, on "Instrumentation for Exobiology Investigation"; Professor Alan G. Marshall, of Florida State University, on "Scaling Mass Spectrometric Plateaus: Taking Full Advantage of Natures

The 2000 Gill Prize is awarded to Jonathan V. Sweedler.

Chemistry: Right in the heart of campus



The cover of this year's edition of IU-Chemistry proudly shows off our building. For more information, visit the department's Web site at www.indiana.edu/~alumni/alumni/htm.

Faculty Profile:

Dennis Peters

The decade of the 1960s was marked by a great amount of construction on campus. Not only was the chemistry addition begun and completed, but several large dormitories were built. By the mid-1970s, we saw the Student Health Center, the Geology Building, the Business Building, the Psychology Building, Assembly Hall, and the Main Library. Bloomington itself was rapidly growing in all directions.

When I arrived in Bloomington permanently in June of 1962, the seven-story 1960s chemistry addition was well under way, and Jack Shiner had just replaced Harry Day as Chair. However, until the addition was completed in the spring of 1964 and I moved into the office (A116) next to the freight elevator on the first floor of the addition, my office and research space were on the top floor of Kirkwood Hall (with my colleagues Bob Fischer, Lynne Merritt, and Ward Schaap). The main office and the chair's office were located at the east end of the then-second floor of the original Chemistry Building (where the NMR facility and Joe Zwanziger's laboratory now are), so those of us in Kirkwood Hall made that trek several times daily to obtain our mail.

Those were wonderful times, most memorable because of the camaraderie among all of the faculty. During the academic year throughout the 1960s and into the early 1970s, most of the faculty convened daily for lunch around a large table in the Tudor Room; senior colleagues made sure that the "youngsters" initially Cordes, Ewing, Montgomery, Parmenter, and Peters, soon to be followed by others went to lunch. If, as usually happened, a colleague or two arrived late, everyone simply pushed back his chair to make room for the new arrivals. Great things happened around that table. We learned how the department was organized and run, which colleague to take seriously and which to take with a grain of salt, what research each of us was doing, how our teaching was going, and just about everything else that is important to the development and health of a department in short, we were brought and kept together as a department. If I were to wish for something from the past to be rekindled, it would be for those daily lunches around a big table.



Dennis Peters, the Herman T. Briscoe Professor of Chemistry, is an extraordinarily gifted teacher. Indeed, he has received so many teaching awards that the rest of us can only look with awe upon his accomplishments. He began by winning the Ulysses G. Weatherly Award for Distinguished Teaching at Indiana University in 1969. Thirty-one years later, he is still pulling in teaching prizes: He is a recipient of a 1999-2000 IU Board of Trustees Teaching Excellence Recognition Award an award that he has won two times previously.

Dennis' teaching skills are matched by his popularity, as shown from his selection by the Indiana University Chapter of Alpha Lambda Delta from among 53 campuswide nominees to receive its 1999-2000 Favorite Faculty Award. He also received this award for 1994-1995.

An electroanalytical chemist by trade, Dennis has given many invited lectures at colleges and universities throughout the world. He continues to publish the significant results of his research in the electrochemistry of certain halogenated organic compounds. Dennis has also made staggering contributions in the service of the department, the university, the state, the nation, and throughout the world.

My hat is off to him; we are fortunate that he is our colleague. We offer our readers the following interview with this outstanding teacher as he reflects on students, research, and IU.

Rupert Wentworth

Will you compare IU as it was when you arrived to IU now?

Since 1962, IU has doubled in enrollment from approximately 17,000 to its present size of roughly 36,000 students. In 1962, parking was no problem; one could park behind Ballantine Hall, leave to drive to lunch (as analytical faculty and graduate students did almost every summer day), and return after lunch to find a parking space. Most undergraduates lived in university housing, and there was a rule against undergrads having automobiles, so getting around the campus and Bloomington was comparatively easy, even though Bloomington was much smaller then than it is in 2000. To the east, Bloomington essentially ended at the Eastland Shopping Plaza, there was no College Mall, and the same can be said about the city toward the north, the south, and the west.

***Dennis Peters, circa 1962
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Faculty profile

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been a turn by undergraduates from what might be called purely academic pursuits toward programs for example, business, computer science, and telecommunications that seem to guarantee a greater likelihood of immediate employment.

Turning to graduate students, my 38 years at IU have generally seen an increase in their number and quality. Clearly, as the national stature of the department has risen, we have been more successful in competing for and attracting good graduate students, although there have been some ups and downs. Preserving and enhancing the quality of our faculty, graduate students,

and undergraduates is unquestionably the greatest challenge of the years just ahead.

How has your research evolved since you came to IU?

When I arrived at IU, our research efforts were largely focused on chronopotentiometry, which in 1962 was a fashionable area of electroanalytical chemistry. This was a natural extension of the work that I had done as a graduate student at Harvard University. My first graduate student was Stanley Burden (now professor of chemistry at Taylor University, Upland, Ind.), who developed the theory and instrumentation for a technique called derivative chronopotentiometry. I was also fortunate to inherit three of Bob Fischer's graduate students (Ronald Mitchell, Abdolreza Salajegheh, and Kenneth West) when he left IU in 1963 to become dean of science and mathematics at California State University-Dominguez Hills. Ron studied the chrono-potentiometric reduction of molecular oxygen, Abdolreza carried out some work on the reactions of thioacetamide (following up on some projects I had done as an undergraduate at Caltech), and Ken investigated the extraction of chloroplatinum(IV) complexes into tri-n-butylphosphate. There were also three undergraduates involved in our early research: Stephen Cruser investigated the chrono-potentiometric reduction of copper(II) chloride species, Leroy Franklin did the same for copper(II) bromide complexes, and Randall Caldwell (now in pediatric surgery at the IU School of Medicine) studied some of the equilibria involved in the formation of copper(II) bromide complexes. Lawrence Cox



To add even more cohesiveness to the department, there were quite regular post-Friday seminars, evening get-togethers (TGIF celebrations) of faculty, spouses, and visitors at the homes of senior faculty Ernest Campaigne, Marvin Carmack, Harry Day, Walter Moore, Riley Schaeffer, Jack Shiner, and Ernest Wenkert, among others.

How have student attitudes changed since your arrival at IU?

In the early 1960s, it seems to me that undergraduates were generally well prepared for college work and that they did indeed work conscientiously. However, beginning with the assassination of President Kennedy in November 1963 and most certainly in the late 1960s with disillusionment about the war in Vietnam and the scenes at Kent State University, student attitudes and appearances underwent a dramatic change. Even at relatively conservative IU, that was the time of long-hair styles, disaffection with all authority, and a disdain for academic work.

I recall in 1969 sitting in the back of the old lecture hall at a C106 lecture by Professor Ralph Seifert (because I was serving as an extra associate instructor for that course), and being abruptly brought to my senses at an unexpected moment by loud and horribly disruptive jeers from students. Ralph, a gentleman if ever there was, never fully recovered from that incident. There was even a massive anti-war rally in Dunn Meadow. After spending a sabbatical year (1971-1972) in Brisbane, Australia, at Queensland University, I returned to Bloomington to find that almost none of the faculty wore full suits and ties, as we had done for every lecture and laboratory meeting before I went to Australia. A few days after returning from Australia, I almost got wiped out by a speeding bicyclist in front of the Indiana Memorial Union a year dealing with Australian traffic had taught me to look right, not left, when stepping off the sidewalk curb.

Undergraduates have continued to change as the years have gone by. In chemistry, as the stature of the department increased through all of the 1980s and into the early 1990s, we attracted more outstanding undergraduates, and the number of baccalaureate degree recipients rose to the point that for several years we graduated more chemistry majors than any other university in the nation. In recent years, however, there seems to have

Dennis Peters today

came along in the late 1960s to do some nice work on the synthesis and photochemistry of chloroplatinum(IV) complexes. During the same period, Henry Longerich and Armi Nobrega did a lot of work on the behavior of gold electrodes, while James Sheaffer investigated the aquation of chloroplatinum(IV) complexes by means of thin-layer electrochemistry and Norman Smith studied the chronopotentiometric behavior of several platinum coordination compounds.

Starting in the late 1960s, our research took a new direction. Professor Jack Crandall, who had been looking at the tri-n-butylhydride-promoted intramolecular cyclization of acetylenic halides (such as 6-iodo-1-phenyl-1-hexyne) asked us if electrochemistry could be used to elucidate some mechanistic aspects of the intramolecular process. At that time my newest graduate student, W. Michael Moore, began to investigate the electrochemical reduction and intramolecular cyclization of several acetylenic halides. It was not long before we realized that the electrolytic scission of the carbon-halogen bond is a key to the process and that surprisingly not nearly enough was known about the electrochemical behavior of even simple alkyl monohalides. Thus, we launched a program of investigations of the reduction of alkyl halides that took us through much of the 1970s and into the middle 1980s. Among the others who played key roles in this research were graduate students Nick Bensko, William Carroll, Raymond Chen, James Cleary, Daniel La Perriere, Gary McNamee, Mohammad Mubarak, and Kenneth Vieira and undergraduates Mark Anderson, Eric Torp, and Brian Willett.

From the late 1980s into the early 1990s, we undertook a variety of both experimental and theoretical studies that focused on the reduction and isomerization of various acetylenes and allenes. Joseph Stemple and Matthew Vincent were the principal architects of that research. Wayne Pritts and Greg Urove, who arrived at IU in the fall of 1988, did their thesis work on the reductions of dihaloalkanes and of acyl halides, respectively. Then, with the arrival of Christopher Dahm in 1990, our research took yet another turn to focus on the catalytic reduction of halogenated organic compounds by electrogenerated transition-metal complexes (for example, metal salens). Over the last 10 years, Dahm and Mubarak, along with graduate students Kent Alleman, Lee Klein, Michael Samide, and now Danielle Goken and Parichatr Vanalabhpatana and undergraduates Deepta Bhattacharya, Scott

Emely, Andrew Moad, and Philipp Raess have been involved in this work. Over the past four years, Mubarak and present graduate student Chang Ji have investigated the electrochemical behavior of a number of families of halogenated heterocyclic compounds. Also in recent years, we have had enjoyable and fruitful collaborations with the research groups of professors Malcolm Chisholm, Ernest Davidson, Lawrence (Mike) Montgomery, and James Reilly. Finally, over the last several years, we have struck up a wonderful collaboration with the group of Professor Jacques Simonet, at the University of Rennes (Rennes, France), in studying the electrochemical behavior of sulfones.

From a different perspective, our most significant research is the work we are doing at this moment. Each new research project builds upon our prior knowledge and experience, and to be worthwhile each new research project should add something new to our total knowledge and experience. Almost every new graduate student who decides to join our group has never previously done any electrochemistry, so every thesis constitutes not only a new body of knowledge but also the evidence that a student has gained some mastery of the processes required to identify and solve challenging problems, no matter what area of chemistry may be embraced.

What were some of your memorable moments at IU?

Anyone who has been at IU for more than 38 years can think of many memorable moments. Certainly, one memorable moment occurred during the dedication of the new addition to our building in October 1988. As part of those ceremonies, which included an academic procession into the remodeled auditorium (later the Harry Day Lecture Hall), I was fortunate to receive a Chemical Manufacturers Association National Catalyst Award for Excellence in Chemistry Teaching. What made the event so special and memorable was that I was amidst my friends, colleagues, and students those whom I care most about not at some distant venue far removed from Indiana University.

Another moment one with a peculiar blend of humor, embarrassment, and irony came at the annual Founders Day celebration in April 1975 when I was named the Briscoe Professor of Chemistry. In mid-morning, when I went to the IU auditorium for the event, I knew I was supposed to march with the platform party and to be seated on the stage to

(continued on page 16)



William Carroll, an adjunct professor in our department, a vice president for Occidental Chemical, and a recipient of a PhD from Indiana University in 1978, received the Roy T. Gottesman Leadership Award from the Vinyl Institute. The award is presented periodically to individuals who have provided exemplary service to the Vinyl Institute and the vinyl industry.

George Christou has had a busy year, with lecture tours of universities in California and the United Kingdom in the spring, followed by a one-month invited professorship in May at the Pierre et Marie Curie University in Paris. He was hosted by Professor

Michel Verdaguer and gave a series of lectures/tutorials on his research areas of single-molecule magnetism and bioinorganic chemistry, as well as participating in all research activities of the Verdaguer group. He also presented some recent results in his magnetism program as an invited speaker at the ACS meeting in San Francisco in a symposium in honor of ACS Award recipient Joel Miller and as a keynote speaker at the seventh International Conference on Molecular Magnetism in San Antonio in September. The proceedings of this meeting will be published as a special issue of *Polyhedron*, for which journal George continues as editor for the faculty news

Adam Allerhand was an invited speaker at the 2000-01 Scholarship of Teaching and Learning Series, an event on the Bloomington campus sponsored by the vice chancellor of academic affairs and the vice president for research. Adam also participated in the 16th Biennial Conference on Chemical Education at the University of Michigan, during which he made three presentations and co-authored a fourth presentation.

Don Burke received the 2000 Beckman Young Investigators Award from the Arnold and Mabel Beckman Foundation.

Marvin Carmack lives in the Sonoran Desert, but he retains an active interest in Indiana University: He has endowed another scholarship in the School of Music to recognize the pleasure he received from the school's music during more than 35 years. Last summer, he traveled the Rhine River, the numerous locks of the Rhine-Main Canal, and the Danube, starting in Amsterdam and reaching Vienna before returning to Amsterdam. He claims that the best sport around Tucson is watching the pecan trees develop their nuts.

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Faculty profile

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one that has endured for more than 38 years. It is all the time that I have spent at Indiana University. I cannot imagine being anywhere else. In the early years, I was blessed to be associated with senior colleagues who cared deeply about their young colleagues and about the department and university; some of those individuals (Ed Bair, Ernest Campaigne, Marvin Carmack, Harry Day, Stan Hagstrom, Lynne Merritt, Walter Moore, and Jack Shiner) are still around for me to greet. In my more mature years, I have been blessed by my continued association with a group of incredibly talented peers in analytical chemistry John Hayes, Gary Hieftje, Ron Hites, Milos Novotny, and Jim Reilly. I have been blessed by having taught more than 8,500 undergraduates and graduate students, who themselves have taught me how to become a better teacher. Finally, I have been blessed with a wonderful group of graduate students and undergraduate research students, who have succeeded not only in the research laboratory but in life itself. I am very proud of them. How can anyone be more lucky than I?

be called forward by the president of the university at the proper time. However, someone managing the party to go on stage deemed that I was too young and obviously out of place and that I belonged in the regular faculty procession (which ended up with my being seated with all the regular faculty in the front rows of the auditorium). From my position, I kept eying the unoccupied chair on the stage where I knew I should be, and I kept wondering what was going to happen. In due course, my name was called. After a brief uncertainty, which seemed like an eternity, I stood up and worked my way along the row, to the aisle, and then up the wooden stairs to the stage to receive the professorship. For that moment of delay and bewilderment, there was more than a little chuckling on the part of the faculty. However, then and to this day, I am glad I came forth from the regular faculty than from the group of mainly administrators on the stage.

As a last memorable moment, I would choose

AROUND IU CHEMISTRY

Faculty News

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Andrew Feig received an IU Summer Faculty Fellowship for 2000. He and his wife, **Evelyn Jabri**, report the birth of Samuel Peter Feig, who was born on Oct. 11, 1999.

Gary Hieftje will be given the 2001 Pittsburgh Spectroscopy Award at a special symposium in New Orleans.

Ronald Hites continues to serve on the board of directors of the Society of Environmental Toxicology and Chemistry, where he is

the chair of the Awards and Fellowships Committee. He also continues his duties as an associate editor for *Environmental Science and Technology*. He acted as a peer reviewer for a report by the National Academy of Sciences on the Toole Chemical Agent Disposal Facility, and he reviewed the environmental science program in the Department of Chemical Engineering, New Jersey Institute of Technology. He chaired a panel for the National Aeronautics and Space Administration that reviewed proposals for the Mars Surveyor Program. Besides publishing numerous papers, he gave invited lectures at a conference of the 17th Australian and New Zealand Society for Mass Spectroscopy in Threadbo, New South Wales, at Carlton College in Northfield, Minn., at the Environmental Protection Agency in Washington, at the 11th conference of the International Society for Environmental Epidemiology in Athens, Greece, and at the 19th International Symposium on Halogenated Environmental Organic Pollutants in Venice, Italy. Moreover, he resigned his memberships on the editorial advisory boards of *Chemosphere* and *Mass Spectrometry Reviews* to protest the high cost of commercially published journals.

Jeffrey Johnston was recently recognized for outstanding promise in organic chemistry by Boehringer Ingelheim Pharmaceuticals Inc. with a 1999-2000 New Investigator Award. He was also selected by Indiana University to receive a 2000 Summer Faculty Fellowship. He and his wife have reported a new arrival in the family: Ian Christopher Johnston, who was born on Aug. 30, 2000.

After receiving the 1999 Distinguished Faculty Award, **Milos Novotny** was given the 2000 Analytical Chemistry Award from the Society of Analytical Chemists of Pittsburgh in recognition of his numerous contributions to the fields of separation science and bioanalytical chemistry.

Contrary to the popular image of chemists, **Charles Parmenter, Rupert Wentworth, Milos Novotny, and David Clemmer** and their significant others celebrated New Year's
Late breaking news

As this magazine was going to press, it was learned that David Clemmer is the 2000 recipient of the Phi Lambda Upsilon Fresenius Award, which has been given annually since 1965 to "an outstanding young scientist who has attained national recognition in the areas of research, teaching, and/or administration." Former awardees include Martin Karplus (1965), Roald Hoffmann (1969), Richard Zare (1974), Jacqueline Barton (1986), and Peter Schultz (1991). Phi Lambda Upsilon is the national honor society for chemists. The award, which will be presented to David during a special gala to be held in his honor at IU, consists of a plaque and honorarium along with honorary membership in the society.

Americas. In December, he will be a speaker in the magnetism symposium of the Pacificchem Conference in Hawaii. He has also recently been selected as a fellow of the Japan Society for the Promotion of Science and will spend a month giving lectures at many Japanese universities in early 2001.

David Clemmer won an Academic Lilly Research Award for 1999-2000 and an unsolicited grant in recognition of his publication record and outstanding contributions to analytical chemistry. He and his wife are the proud parents of Madeleine Elise Clemmer who was born on Aug. 14.

During his sabbatical leave, **Jack Crandall** spent part of the spring semester at the University of Geneva in the laboratories of Alex Alexakis.

Professor Emeritus **Harry G. Day** was an invited speaker at Johns Hopkins University on April 28 at the School of Hygiene and Public Health's symposium on "Research Highlights of the 20th Century." Day's contribution was titled "E.V. McCollum and the Heyday of Vitamin Research in the Thirties." He continues to work on a biography of McCollum, his mentor and close friend.

Ernest Davidson is the recipient of the 2000 ACS Award in Theoretical Chemistry. *Chemical and Engineering News* described Ernie for this event as "a quantum chemist's quantum chemist. He is noted for myriad contributions to all facets of theoretical chemistry as well as for his penchant for tackling problems that might make other theorists grow faint." He also received an honorary doctorate from the Faculty of Science and Technology at Uppsala University, Uppsala, Sweden, and was recently named the Robert and Marjorie Mann Chair in Chemistry.

Although **George Ewing** has retired, he continues to have an active research program, one that is devoted entirely to the chemistry and physics of ice. This past summer, he gave invited talks related to his research at a Gordon Conference, at the Telluride Research Center, and at a workshop at the Pacific Northwest Laboratory. While he was at Telluride, he also presented to the general public a lecture about ice that is an early draft of a future book for a nonscientific audience. Later this fall, he will serve as a fund raiser at Warren Wilson College, a small liberal arts college near Asheville, N.C.

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Library this year. Last year's GA, **Tim Waugh**, spent the summer as an intern at Dow Chemical Co. in Midland, Mich. **Kent**

Holaday is the first holder of a new 20-hour-a-week position in the Chemistry Library for second-year SLIS students. (**Tim Waugh** has a similar position in the Swain Hall Library.) **Jin Liu** has accepted a position with MDL in Chicago, **Rong (Rose) Liang** is now the chemical database administrator for Centaur Pharmaceuticals in Sunnyvale, Calif., and **Ted Baldwin** is the corporate librarian at the University of Cincinnati. Ted is assigned to Equistar.

The library moved closer to a virtual environment this year, with SciFinder Scholar available 24 hours a day with full substructure searching. Having that available led to a decision to cancel the printed *Chemical Abstracts* as of the end of this year. The Web of Science has been joined by many special databases for chemistry, such as the SPRESI file for chemical reaction searching, Analytical Abstracts, and DGRWeb (the ACS Directory of Graduate Research). The CrossFire for Excel software was added to enhance access to the Beilstein and Gmelin databases.

Gary Wiggins

library news

Roger Beckman was appointed head of the Life Sciences Library, effective March 15. Roger joined the Chemistry Library in August 1988, but had been serving as acting head of the Life Sciences Library since February 1999. **Elizabeth Hanson**, science reference/instruction librarian, now works in the Chemistry Library. Under a staff reorganization plan, her new position will have a home base in the library of the science librarian who serves as coordinator of the science libraries at IUB. **Gary Wiggins** has occupied the coordinator position since February 1999. **Denis Taaffe**, who had been the first full-time science libraries computer coordinator since December 1997, was hired by the chemistry department in August. His replacement is **Amanda Moore**. Finally, our branch coordinator, **Jen Gerber**, was married to Scott Rogers in a lovely outdoor ceremony in June.

New students in the MLS/MIS Chemical Information Specialist Program are **Elizabeth Minkner Harrigan** and **Sonia Gupta**. Sonia is the graduate assistant in the Chemistry

In memoriam

Fred Hardy died on Sept. 11, 2000, in Lakeland, Fla. Fred spent his entire 38-year professional career in chemistry. He came to the IU Department of Chemistry in 1946 at the age of 23 as a stockroom helper for the teaching labs. Within five years, he began giving lecture demonstrations, and 10 years later, he assumed the duties of the assistant to the director of laboratories. His title eventually changed to supervisor of physical facilities, and his responsibilities increased markedly over the years as he became responsible for the coordination of all maintenance in a building that more than doubled in size. He worked with eight chairs and five directors of laboratories or business managers. During his years in the department, the faculty grew in size from 25 in 1961 to 46 in 1984. Fred was an extremely dedicated staff member. He had the ability to accept a myriad of requests, complaints, and criticism from a wide variety of people and still come out smiling. Fred retired in 1984 and he, Maxine, and their family relocated to Florida.

AROUND IU CHEMISTRY

Faculty News

(continued from page 16)

nominees whose proposals and previous academic records clearly indicate a career of excellence and significance.

Lee Todd joyfully reports that he has made it to retirement while he is still breathing (see page 11).

Basking contentedly in the glow of retirement, **Rupert Wentworth** wrote a small book called *Cool Chemistry Demonstrations* for elementary schoolteachers in grades 4-8.

Gary Wiggins received Indiana University's highest service award, the W. George Pinnell Award, at the Founders Day ceremony last spring. He has also been appointed to a three-year term as director of the programs in bioinformatics and chemical informatics in IU's new School of Informatics. He continues as councilor for the Division of Chemical Information for the American Chemical Society and took over as chair of the ACS Southern Indiana Section, when Marty Pagel left IU last February. With faculty from IUB and IUPUI, Gary is developing new graduate courses for the MS programs that will start in the fall 2001 semester. He continues to serve as coordinator of the science libraries.

Rupert Wentworth

Eve with dancing and toasting at a gala formal party in the Monroe County Courthouse. **Ronald Hites** was one of the hosts for this festive occasion.

Dennis Peters (also see page 13) was selected by the Indiana University Chapter of Alpha Lambda Delta from among 53 campuswide nominees to receive its 1999-2000 Favorite Faculty Award as well as a 1999-2000 IU Board of Trustees Teaching Excellence Recognition Award. At the 197th annual meeting of the Electrochemical Society, held in Toronto in May, Dennis presented "Cathodic Cleavage of Sulfones: Formation of Phenolate from Strongly Activated Sulfones," a paper co-authored by Lee J. Klein, a graduate student, and two chemists from the University of Rennes in France.

Martin Stone is the recipient of an Outstanding Junior Faculty Award. These awards are given to recognize the achievements of untenured faculty who show promise of reaching distinction as scholars and artists. The faculty review panel chooses only those



was the second recipient in 1979 of the Departmental Outstanding Staff Member Award.

Farewell to those leaving

Pat Akers, instructional support office; **Gina Vertrees**, technical services office; **Christy Borders**, secretary for professors DeSouza, Ewing, Parmenter, and Zwanziger; **Peter Mikulecky**, technician for Professor Jabri; **Laura Flanigan**, who worked in several capacities, primarily as secretary for professors Crandall, Gajewski, and Montgomery; **Candace Friend**, technician for Professor Burke; and **Mike Squires**, systems analyst/programmer and manager of instructional computing, who also is pursuing a master's degree in SPEA.

Greetings to new staff

Lara Zabawa, an IU graduate with a BS in English, is working with Professor Ortoleva as research secretary and editorial specialist. She had been employed in the athletics department since her December 1998 graduation. **Nicole Sullivan**, a graduate of the University of Massachusetts who has a master's degree in veterinary science from the University of Kentucky, has joined Professor Burke as a lab technician. **Josh Meyers** is the new office services assistant senior for technical services. He is working on a degree in SPEA in environmental science. **John Tomzszewski**, who received his PhD in organic chemistry from the University of Washington, has come to the NMR lab. **Denis Taaffe** has taken a new position in the information technology group. He became the first full-time computer

staff news

Annual awards honor staff

Several honors were presented to the staff at the annual chemistry staff awards dinner, held on May 3 in the Tudor Room. **Ann Martin** was the recipient of the Chemistry Staff Award. Ann is currently research secretary for professors DeSouza, Ewing, Parmenter, and Zwanziger and continues to assist Professor Chisholm during his transfer to Ohio State University. This prize is given to a staff member who is cited for exceptional service to the department.

At the dinner, the following staff members were recognized for their IU employment anniversaries: **Kirsten Streib**, molecular structure center crystallographer, 35 years; **Patricia Stapleton**, graduate office manager, 30 years; **Ray Sporleder**, research computer systems engineer, 30 years; **Mary Swarthout**, chair's administrative assistant, 25 years; **Jeff Tate**, research machinist in mechanical instrument services, 20 years; **Gayla Bradfield**, accounting associate in the business office, 20 years; **Jack Baker**, chemistry facilities engineer, 20 years; and **Gary Fleener**, manager of the mechanical instrument services, 15 years. Additionally, four people who could not attend the dinner were awarded service honors: **Tom Hacker** and **Mike Jackson**, both from our freshman teaching lab, 30 years each; and **Kathy Fisher**, now with the chair's office, received a 25-year award.

John Dorsett Retires

On Jan. 20, a retirement celebration was held for **John Dorsett** on the ground floor of the atrium of the Chemistry Building. His 36 years of service encompassed an unparalleled career in machining and instrument design. From 1976 until his retirement a period that saw the department grow into one of the premier facilities in the country he supervised mechanical instrument services. Among those who spoke about John's many achievements were Gary Hieftje, Ed Bair, John Huffman, Gary Fleener, Victor Viola, and George Ewing. John

*John Dorsett examines one of several gifts he received at the retirement reception held in his honor.
(continued on page 20)*



Fellowships

The General Electric Fellowship went to **Cherokee S. Hoaglund Hyzer**, who completed her undergraduate studies in chemistry and mathematics at Adrian College in Adrian, Mich. In fall 1986, she joined Professor David E. Clemmer's research group, where her research involves the development of ion mobility/mass spectrometry techniques suitable for the analysis of complex biological mixtures. Early studies included ion mobility measurements of deoxyribonucleic acids and development of an ion trap interface for increased experimental efficiency. Presently she is working on the design and development of a mobility labeled parallel sequencing technique that utilizes electrospray ionization, a drift tube, a quadrupole mass spectrometer, an octopole collision cell, and a time-of-flight mass spectrometer for characterization of complex mixtures.

Andrew M. Leach received the Eli Lilly Fellowship in Analytical Chemistry. He earned
Students receive special awards

The board of directors of the International Precious Metal Institute has selected **Joseph Coalter** to receive its annual Student Award for his research in synthesizing a ruthenium carbene compound simply by isomerizing an olefin to a vinyl ether.

The award is given to recognize and encourage outstanding work by a graduate or undergraduate student in precious metals research.

The award of \$2,500, along with a certificate citing his work, was presented at IPMI's annual meeting at the Williamsburg Marriott Hotel, Williamsburg, Va., in June.

Cherokee Hoaglund Hyzer and her crew did such an outstanding job with the 1999 National Chemistry Week program that it drew the attention of the American Chemical Society. The society nominated the Southern Indiana Section for a Phoenix Award in the category "Most Unique Open House."

The Phoenix Awards were presented during the ACS national meeting at the ChemLuminary Awards session on Aug. 22. The SIS is one of only three sections to be nominated for this honor.
graduate

notes



The graduate program in chemistry is directed by two faculty committees. The Standards Committee, responsible for the graduate program, was chaired by Professor **Jack K. Crandall**, the director of graduate studies, his 10th year to do so. Other members of the Standards Committee this year were professors **Dennis G. Peters** (analytical), **Martha G. Oakley** (biochemistry),

George Christou (inorganic), **Lawrence K. Montgomery** (organic), and **James P. Reilly** (physical).

The Admissions Committee, chaired by Professor **Kenneth G. Caulton** included professors **David E. Clemmer** and **Dennis G. Peters** (analytical), **Donald H. Burke** and **Evelyn Jabri** (biochemistry), **George Christou** (inorganic), **Jeffrey N. Johnston** and **David R. Williams** (organic), and **Josef W. Zwanziger** (physical).

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AROUND IU CHEMISTRY

Staff News

(continued from page 19)

service coordinator/program manager for the Infant and Child Developmental Services Agency.

Staff change positions

Kathy Fisher has moved from being research secretary for professors Clemmer, Nie, and Peters to a position in the chair's office. She started as our graduate admissions secretary before serving as research secretary for 12 years for Professor Grieco. **Brian Crouch**, who was the associate manager of the information technology group has been promoted to manager. **Ken DeHart** has moved from the NMR lab to the ITG. **Gary Fleener**, who has 15 years of experience in the group, has been appointed manager of mechanical instrument services, replacing now-retired **John Dorsett**.

Judi Roberts, administrative secretary to the chair, won a \$10,000 college scholarship as one of five winners nationwide in the Leaders for Learning Essay Contest sponsored by CVS Pharmacy and Unilever Home and Hair Products. Judi earned her associate degree in business from Clark College, Vancouver, Wash., and is now enrolled in the College of Arts and Sciences as an English major.

Ulli Werner-Zwanziger, manager of the NMR facility, became a new mother to a daughter in August.

Loyd Hudson and Judy Johnson Crandall

support assistant in the sciences libraries in December 1997 and has played an integral part in improving library services for the science departments on campus. Denis previously worked as a computer consultant for IU's Access Service and has run his own computer business. **Jeanette Ash** joined the business office as office services assistant, and her husband, Jason, has started in our PhD program. Jeanette came from Kentucky, where she had gained excellent office experience with several companies and as a computer lab assistant at Campbellsville University. **Heather Kidd** joined the instructional support office as records assistant. She is a 2000 graduate of Eastern High School and had been with the University Division Office of Records.

Welcome back to returning staff

Amy Boles, previously a lab tech for Professor Ellington, completed her MFA in photography in the IU School of Fine Arts and is now working for Professor Burke as a lab technician. **Lee Ann Mobley**, has returned to the department as research secretary for Professor Hieftje. She was formerly research secretary for professors Oakley and Widlanski before leaving in October 1998 to take the position of family

AROUND IU CHEMISTRY

Graduate Notes

(continued from page 20)



his BS in chemistry from Union College, New York, in 1996. Since joining the research group of Distinguished Professor and Robert and Marajhorie Mann Chair Gary M. Hieftje, his work has focused on two distinct areas of spectroscopy. The first involves the examination of radioluminescence (light generated from energy released through radioactive decay) as a novel light source for remote spectrochemical sensing applications. The second area of research involves the design, construction, and investigation of a plasma-source time-of-flight mass spectrometer for ultratrace elemental analysis. This ongoing research focuses on instrumental characterization and innovation, including the design of novel ion optic arrangements and sample introduction systems.

Joseph N. Coalter, the recipient of the Lubrizol Fellowship, received his BS from West Virginia University in 1996. He joined Distinguished Professor Kenneth G. Caulton's research group in the fall of 1996. Because metal carbenes are extremely useful for organic transformations, although their preparation involves expensive or dangerous high-energy reagents, Coalter's research focuses on alternative methods for synthesis of metal carbenes from inexpensive, benign materials. In addition, he is introducing new supporting ligands to control molecular geometry for enhanced activity and application in C/C bond forming reactions to produce olefins.

The Procter and Gamble Fellowship went to **Lee J. Klein**, who received his undergraduate degree from Oral Roberts University in 1996. After working briefly in Tahlequah, Okla., at the soil testing laboratory of the Greenleaf Corp., he entered the chemistry graduate program at IU. He is currently an analytical PhD student in the laboratory of Herman T. Briscoe Professor Dennis G. Peters. His research projects are focused on the identification and quantitation of intermediates in the cobalt(I) salen-catalyzed reduction of alkyl halides.

Lori A. Watson, a graduate of the University of Kentucky, was awarded a three-year National Science Foundation Fellowship. She is a first-year student of Distinguished Professor Kenneth G. Caulton.

Sarah A. Webb holds a National Defense Science and Engineering Graduate Fellowship. This three-year award is sponsored by the U.S.

Army, Navy, and Air Force. She received her undergraduate degrees (BA/BS) from Furman University in 1996. Web is currently doing research with Professor Martha G. Oakley that involves using organic synthesis to probe protein-lipid interactions in signal transduction pathways.

Because of their outstanding undergraduate academic achievements **Katherine J. Gill** (BA, 1999, Stetson University) and **Kelly A. Warner** (BA, 1998, Bowdoin College) were awarded five-year Women in Science Graduate Fellowships. Gill, who is doing research with Distinguished Professor Ronald Hites, entered IU in fall 1999, and Warner, who is doing research with Distinguished Professor Gary M. Hieftje, in fall 1998.

In addition, fellowships were also awarded to **Parichatr Vanalabhpattana**, Anandhamahidol Foundation Scholarship; **Todd A. Brugel**, Berk Fellowship; **Stephen J. Valentine**, College of Arts and Sciences Dissertation Year Research Fellowship; **David C. Kammler**, Kratz Fellowship; **Lewis J. Belcher**, **David C. Johnson**, **Amie L. Williams**, Paget Fellowships; **Khamphee Phomphrai**, Royal Thai Government Fellowship; and **Youngchan Kim**, RUGS Biochemistry Fellowship.

The Department of Chemistry has been selected by the U.S. Department of Education to participate in the Graduate Assistance in Areas of National Need Fellowship Program. We currently have two grants. The fellowships were awarded to **Catherine A. Srebalus Barnes**, **Benjamin T. Burlingham**, **Nicole L. Coalter**, **Amita Datta**, **Daniel G. Gurnon**, **John P. Guzowski**, **Richard W. Heidebrecht**,

Teaching Excellence Recognition Award winners for 1999-2000, from left, are David B. Engel, David C. Kammler, Tara L.

Prendergast, and Denise M. McClenathan.
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AROUND IU CHEMISTRY

Graduate Notes

(continued from page 21)



Scott V. Plummer, Bradley J. Shaw, and John M. Strelow.

Research and University Graduate School Fellowships were awarded to **Sarah B. Cortright, Katherine J. Gill, Danielle M. Goken, Robert T. Hart, Michael P. Julius, Kyle W. Kimble, Samarjit Patnaik, Michael A. Plotkin, Manami Roychowdhury, John M. Strelow, Matthew S. Thompson, Wei Wang, Lori A. Watson, William C. Wetzel, Christopher W. Wilhite, and Gina A. Zientara.**

Annual honors and awards

At the Chemistry Honors Banquet in April, the following students were honored.

Teaching Excellence Recognition Awards (TERA) for excellence in teaching:

David B. Engel

David C. Kammler

Denise M. McClenathan

Tara L. Prendergast

E. Campaigne C500 Introduction to Research Award: **Khuloud Jaqaman**

Felix Haurowitz Award (best overall performance): **Viktor N. Staroverov**

Henry R. Mahler Memorial Award (biochemistry research): **Sarah A. Webb**

William Nebergall Memorial Award (inorganic research): **Cristina V. Cañada**

Wendell P. Metzner Memorial Award (organic research): **Benjamin T. Burlingham**

Charles N. Reilley Award (analytical research): **Catherine A. Srebalus Barnes**

PhD degree recipients

Recent degree recipients are listed, followed by area, research professor, graduation date, and first position accepted.

Arnold, Randy J. (analytical, Reilly, September 1999), assistant professor, Huntingdon College, Montgomery, Ala.

Aromi, Guillem B. (inorganic, Christou, February 2000), postdoc, Leiden University, Netherlands.

Baker, Andrew G. (analytical, Novotny, February 2000), application specialist, Micromass Inc., Beverly, Mass.

Baker, John I. (analytical, Hites, February 2000), chemist, Hennepin Hospital, Minneapolis, Minn.

Bennett, Chad E. (organic, Roush, June 2000), postdoc, Stanford University, Stanford, Calif.

Brugel, Todd A. (organic, Williams, April

Annual Research Award Winners for 1999-2000, from left, are Benjamin T. Burlingham, Cristina V. Cañada, Sarah A. Webb, Viktor N. Staroverov, Khuloud Jaqaman, and Catherine A. Srebalus Barnes.

Fellowship Recipients for 1999-2000, from left, include David C. Kammler, Katherine J. Gill, Cherokee S. Hoaglund Hyzer, Sarah A. Webb, Andrew M. Leach, Lori A. Watson, Lee J. Klein, Kelly A. Warner, and Joseph N. Coalter.



2000), postdoc, Colorado State University, Fort Collins, Colo.

Christian, Noah P. (analytical, Reilly, April 2000), postdoc, Centre National de Genotypage, Paris, France.

Clegg, Samuel M. (physical, Parmenter, September 1999), postdoc, University of Chicago.

Glasgow, Katherine C. (inorganic, Chisholm, March 2000), process chemist, General Electric Plastics, Mount Vernon, Ind.

Houston, Christopher T. (analytical, Reilly, September 1999), research scientist, Pharmacia & Upjohn, Kalamazoo, Mich.

Jhaveri, Sulay D. (biochemistry, Ellington, March 2000), postdoc, Naval Research Laboratory, Washington, D.C.

Koren, Patrick R. (physical, Davidson, June 2000), programmer, B.F. Goodrich Co., Columbus, Ohio.

Lato, Susan M. (biochemistry, Ellington, September 1999), toying with the idea of starting a bioinformatics dot-com.

McLaughlin, Jay C. (physical, Zwanziger, July 1999), postdoc, National Institute of Standards and Technology, Gaithersburg, Md.

Meyer, Kevin G. (organic, Williams, November 1999), research scientist, Dow Agrosiences, Indianapolis.

Myers, Brian J. (organic, Williams, June 2000), postdoc, Wayne State University, Detroit.

Pfeifer, Lance A. (organic, Roush, May 2000), postdoc, University of California, Irvine.

Renkema, Kenton B. (inorganic, Caulton, March 2000), postdoc, Rutgers University, Piscataway, N.J.

Scheidt, Karl A. (organic, Roush, July 1999), postdoc, Harvard University, Cambridge, Mass.

Starkey, Kyle P. (organic, Montgomery, November 1999), postdoc, University of California-Los Angeles.

Stone, Todd A. (physical, Parmenter, June 2000), postdoc, Harvard University, Cambridge, Mass.

Wagrowdki, Diane M. (analytical, Hites, August 1999), research scientist, Dow Agrosiences, Indianapolis.

Walker, Daniel P. (organic, Grieco, February 2000), research scientist, Pharmacia & Upjohn, Kalamazoo, Mich.

Walker, John K. (organic, Grieco, August



1999), senior research investigator, Searle, St. Louis.

Zechmann, Cecilia A. (inorganic, Caulton, November 1999), postdoc, Sandia National Laboratories, Albuquerque, N.M.

Zidek, Lukas (biochemistry, Novotny, July 1999), postdoc, Masaryk University, Czech Republic.

MS degree recipients

Artus, Pau C. (inorganic, Christou, February 2000), Akzo Chemical, near Barcelona, Spain.

Barvian, Kevin K. (organic, Widlanski, December 1999), scientist, GlaxoWelcome, Research Triangle Park, N.C.

Freeman, Jennifer C. (organic, Widlanski, November 1999), Abbott Laboratories, Chicago.

Griffin, M. Todd (analytical, Reilly, June 2000).

Grimes, John H. (organic, Widlanski, February 2000), chemist, Sphinx Pharmaceuticals, Cambridge, Mass.

Henderson, Sheila C. (analytical, Clemmer, December 1999), Naval Weapons Support Center, Crane Naval Center, Indiana.

Hinkens, Diane M. (analytical, Novotny), August 1999), Abbott Laboratories, Chicago.

GAANN Fellows, from left, are Benjamin T. Burlingham, Nicole L. Coalter, Richard W. Heidebrecht, Catherine A. Srebalus Barnes, Scott V. Plummer, Bradley J. Shaw, and John P. Guzowski.



Paget Fellows, from left, are Amie L. Williams, Lewis J. Belcher, and David C. Johnston.
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undergraduate notes

again a success. We had 22 companies that giving 209 interviews during the recruiting season. The companies that were on campus last fall included Abbott Laboratories, Baxter Healthcare, Cargill Inc., Cook Imaging Inc., Dow AgroSciences, Eli Lilly &

Co., General Electric Co., Merck & Co. Inc., National Starch & Chemical Co., Parke-Davis Rsh./Warner-Lambert Co., Pfizer Inc., Pharmacia & Upjohn Inc., PPG Industries Inc., Procter & Gamble, Radian Corp., Roche Diagnostics, Sigma Chemical Co., SmithKline Beecham Pharmaceuticals, Stepan Co., Lubrizol Corp., Procter & Gamble Co., and Wyckoff Chemical Co.

Our fall recruiting program for 2000 is under way with a full schedule of interviews. If you or your company is interested in recruiting at IU, please contact Steven M. Wietstock at (812) 855-2700  for additional information on the Chemistry Placement Program. We are also interested in setting up internship (summer and academic year) opportunities for students. If you are aware of positions, please contact the ISO at the above number. It is the strength of the department's alumni that continues to strengthen our placement and internship programs.

Scholarships and awards

The annual Chemistry Honors Banquet was held on April 13, with a record-setting attendance of 240 individuals. The following awards and honors were presented this year:

- R.J. Grim Scholarships

Class of 2002: Sudhir Rama Belagaje, Rolando Wray De Angelis, Scott Richard De Boer, Melinda J. Kidwell, David Eugene Stiasny, Robert Tayon

Class of 2001: Bao Thien Huynh, Kristen Elizabeth Nailor, Raju R. Raval

Class of 2000: Philipp W. Raess, Jeff Neil Stuart, Lisa Renee Welp, Greg Jeffrey Williams

- Lubrizol Scholarship

Brad Allen Hook, Chris G. Hughes, Mari Nojiri, Jennifer Eryn Sprague

- National Starch & Chemical Co. Scholarship

David Ming-Dar Fang, Danielle Summer O'Donnol, Andrew James Overhiser

- William Klinkenberg Scholarship

Scott Richard De Boer

- John H. & Dorothy McKenzie Scholarships

Martinson Kweku Arnan, Mackenzie Anna Ford



During 1999-2000, Professor **Dennis G. Peters**, Briscoe Professor of Chemistry, continued as the director of undergraduate studies, and **Steven M. Wietstock** continued as the coordinator of instructional programs. In August, **Mike Squires** left the position of manager of instructional computing to return to graduate school to complete a degree in public administration. A search has begun to find his replacement. **Patricia Akers**, student records assistant, left the instructional support office in June. We would like to introduce **Heather Kidd** as our new student records assistant. The other members of the instructional support office are **Alice Dobie-Galuska**, general chemistry assistant coordinator, and **Judy Summerville**, scheduling and registration manager. The ISO supports academic advising, maintaining undergraduate student records, recruiting, scheduling of classes, providing undergraduate academic computer support, supporting the freshman laboratories, and coordinating information on curricular and pedagogical reform in undergraduate chemical education.

The fall 1999 recruiting program was once

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Graduate Notes

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Marcus, Lawrence M. (organic, Peters, March 2000), graduate school, Washington University, St. Louis.

Schwartz, Lisa M. (analytical, Peters, December 1999), research chemisty, Applied Laboratories Inc., Columbus, Ind.

Stine, Robert M. (organic, Gajewski, June 2000), associate scientist, Schering Plough, Kenilworth, N.J.

Vasques Miranda, Erick (biochemistry, Daleke, June 2000), senior research technologist, St. Jude's Children's Research Hospital, Memphis, Tenn.

Wild, Steven C. (physical, Kesmodel, March 2000), manager, food industry, Virginia.

Woods, Howard L. (biochemistry, Oakley, May 2000), scientist, Roche Diagnostics, Indianapolis.

Pat Stapleton

· Francis and Mildred (Ecktery) Whitacre Scholarship

David Ming-Dar Fang

· John H. Billman Summer Scholarship

Rolando Wray De Angelis

· Jean Dreyfus Boissevain Undergraduate Summer Scholarship for Excellence in Chemistry

Robert Tayon

· Harry G. Day Scholarships

Mariya K. Chhatriwala, Peter B. Conrad, Scott Richard De Boer, David Ming-Dar Fang, Chris G. Hughes, Bao Thien Huynh, Samay Jain, Kelly Kristine Kahl, Melinda J. Kidwell, Charles Chauncey L. Mc Crory, Andrew James Moad, Kristen Elizabeth Nailor, Robert Lewis Powell, Robert Tayon, Chad H. Weaver

· Ira E. Lee Summer Scholarships

Andrea Renee Auth, Olivier Rene Roux

· Frank Mathers Undergraduate Summer Research Scholarships

Martinson Kweku Arnan

· Earl G. Strudevant Summer Research Scholarship

Melissa Thal

· Votaw Undergraduate Summer Research Scholarship

Gia Charest Fazio, Eric David Shank

· Women in Science Undergraduate Summer Fellowship

Kelly Kristine Kahl, Melinda J. Kidwell

· Pharmacia & Upjohn Inc. Summer Scholarships

Charles Chauncey L. McCrory, Peter B. Conrad, Samay Jain, Chad H. Weaver

· Eli Lilly Summer Scholarships

Robert Lewis Powell, Ronald D. Willis

- Roche Diagnostics Summer Scholarships

Andrew James Moad

- Honors Division Summer Scholarships

Mariya K Chhatriwala, Scott Richard De Boer, David Ming-Dar Fang, Chris G. Hughes, Bao Thien Huynh, Kristen Elizabeth Nailor

- Russell & Trula Sidwell Hardy Scholarship

Robert Tayon

- Merck Index Awards

Mike William La Grange, Andrew Joseph Labelle, Jay Balvant Patel

- Analytical Chemistry Award

Andrew James Moad

- Enola Rentschler Van Valer Trafford Scholarship Award

Kelly Kristine Kahl, Lisa Renee Welp

- Courson-Greeves Prize

Bao Thien Huynh

- William H. Bell Awards

Chris G. Hughes, Kristen Elizabeth Nailor, Robert Lewis Powell

- Alpha Chi Sigma Award

Jeremiah Lee Hubbard

- Hypercube Scholar Award

Jeff Neil Stuart

- Joseph B. Schwartzkopf Award

Philipp W. Raess

- ACS Award

Paiboon Ngerneesri

- Mary Frechtling White Award

Jennifer Eryn Sprague

- James C. White Award

Greg Jeffrey Williams

Thanks to supporters

We appreciate all the sponsors who have made these awards and scholarships for our undergraduate students possible. We

congratulate these students on their achievements and express our best wishes to each of our graduating seniors for a long and successful career.

This has been an exciting year for the undergraduate program, and we appreciate our many alumni who keep in touch with the department and who continue to provide new opportunities for our students.

Steven M. Wietstock



Alumni Profile:

Mary Campbell

Mary Campbell came to Indiana

University from Rosemont College

and, in 1965, took her PhD in physical chemistry in the group of Walter Moore and Henry Mahler. After postdoctoral work in biophysical chemistry at Johns Hopkins University with Paul Ts'o from 1965 to 1968, she joined the chemistry department at Mount Holyoke College as an assistant professor, rising to a full professorship in 1981. Since 1995, she has held the endowed Virginia Apgar Professorship.

Campbell has served three times as department chair. In 1974-75, she was a visiting scientist at the Universite de Paris, and has twice been a visiting professor at the University of Arizona. Among her academic honors has been the Marie Curie Fellowship of the American Association of University Women.

Mary has supervised the undergraduate research of about 25 students, most of whom have gone on to graduate degrees in science or medicine. Her textbook *Biochemistry* is currently in its third edition (1999) and has been translated into Korean, Chinese, Japanese, and Italian.

Her services to science education have been many and varied, including NSF evaluation panels. She received grants from the NSF and the DuPont Trust for the project "Revitalizing Introductory Chemistry Laboratories."

"The ideas that worked best," says Campbell, "were project-type labs in which several students worked together doing something original, such as water studies on local ponds, analysis of inks from a forensic viewpoint, and spectroscopic studies leading to Beer's Law."

Mary's main hobby has been architecture. "I learned enough about it," she says "to have taught a course in it several times." She has delved into Aztec and Mayan monuments to study how they were used in astronomy. Her favorite sport is serious hiking, which she undertakes with her two Bernese mountain dogs, Jake and Lolly.

"My years in Bloomington were good ones," says Campbell, "and I can recommend combining studies at a large university with those at a small liberal art college. I always enjoy hearing from anyone at IU."



Curtis Smith

Mary Campbell hugs hiking companions Jake and Lolly.



alumni news

Eric E. Allen, PhD'88, is senior scientific programmer at Amgen Inc, Thousand Oaks, Calif. He worked for 10 years at Merck & Co., Rahway, N.J., where he was at the synthetic chemistry bench for seven years. For the past five years, he has been building chemical information systems. Since moving to California, which they love, Allen and his wife, Janice, have bought three Icelandic horses and enjoy the citrus trees on their property.

Mark R. Anderson, BS'83, has been on the chemistry faculty at Virginia Polytechnic Institute and State University much of the time since he completed his PhD degree at the University of Wisconsin. For the 1999-2000 academic year, he was on sabbatical leave at the University of North Carolina at Chapel Hill. During the past decade, he has traveled and lectured both in France and in this country. His father is a physician in Bloomington and his grandfather "Andy" Anderson, who lives at Meadowood, is prominent in part by being a little more than 100 and still driving his car locally. With this background, Mark should accomplish much in the decades ahead.

Alan W. Becker, BS'78, JD'81, is a partner with the law firm Bose McKinney & Evans in Indianapolis. He has been accepted as a life member by the National Registry of Who's Who in recognition of his exemplary service to community and profession.

William F. Carroll Jr., PhD'78, vice president for chlorovinyl issues at Oxychem, Dallas, Texas, and chair of Vinyl Institute's Operating Committee, was recently honored with the Roy T. Gottesman Leadership Award from the Vinyl Institute. He has helped the industry address its most complex issues, ranging from combustion and dioxin toxicity to the mechanics of vinyl recycling. Carroll holds two patents and has written many publications in the fields of organic electrochemistry, polymer chemistry, combustion chemistry and physics, incineration, plastics recycling, and chlorine issues.

Leon Ellenbogen, PhD'54, chief of nutritional science with American Cyanamid Co., Lederle Labs, Pearl River, N.Y., has retired from the company. In 1999, he became a member of the Fellows Committee of the American Society for Nutritional Sciences. He has been a member of the ASNS since 1966 and continues to be active in the organization.

Frank A. Guthrie, PhD'62, has chaired the trustees of the Indiana Academy of Science since 1986 and was reelected in the fall of 1999. He was president of the academy for a year prior to this service and is also a fellow. A graduate of Hanover College and IU, he has been on the faculty at Rose-Hulman for many years, having served as chair of the chemistry department there from 1968 to 1972. He is almost identifiable as a "Hoosier schoolmaster." Besides this and other experiences, he was visiting professor of chemistry two different times at the U.S. Military Academy.

Leland G. Howard, BS'50 retired from Eli Lilly & Co. in 1984. He had been the purchasing agent for Lilly's Clinton, Ind., laboratories for many years. Lee and his wife, Marilyn, now live in Bloomington, where he continues to be involved in art collection and art history. In addition to Lee's strong support of the chemistry department, he is a benefactor of the university's

art school and museum.

Robert E. Howard, PhD'75, is professor of chemistry at the University of Tulsa. As prominently reported in *C&EN* (July 2000), Howard "received the Oklahoma Chemists Award for 2000 at the 45th pentasectional meeting of the ACS Oklahoma Sections held in April at Oklahoma State University." He "was cited for his long and enduring work with teachers and students in an effort to broaden and stimulate chemical education." In writing to us about it, at our request, he gladly stated, in part: "The award is made on the basis of research and service to the chemistry community and state. It includes an honorarium and plaque, and the awardee addresses the Oklahoma ACS Pentasections Meeting, the annual meeting of the five Oklahoma ACS groups. Since, surprisingly, there are several hundred ACS members in Oklahoma, the award was a great honor."

It should be added that in 1993 Robert received the National Merck Foundation Award for Innovative Science Education.

Besides all of this, as reported by Robert to us at IU, his wife "was named the outstanding middle school math teacher in Oklahoma" by the MAA in the same week the Oklahoma Chemists Award was announced. She received her MA in mathematics at IU in 1992.

Ted K. Logan, BA'53, as reported in *C&EN* September 1999, was elected to the ACS

15 YEARS AGO

in March of 1985, the

Chemistry Computational Center was officially opened with a ceremony presided over by IU President John Ryan and a symposium on Theoretical Chemistry organized by Professor Ernest R. Davidson. This new facility was part of the attraction that had brought Professor Davidson back to IU earlier that academic year, after a number of years at the University of Washington. He had, of course, done his PhD studies here with Professor Harrison Shull in 1958-61.

Since his return to the department, Davidson has been instrumental in the development of an internationally recognized program in theoretical chemistry at IU. He was named a Distinguished Professor in 1986 and was elected to the National Academy of Sciences in 1987. Davidson was selected as the recipient of the prestigious ACS Award for Computers in Chemistry in 1992 and for Theoretical Chemistry in 2000. In July, he was appointed to the Robert and Marjorie Mann Chair in Chemistry. At the same time, Davidson undertook the challenging administrative duties of chair of the department. Clearly, it has been a full and productive 15 years!

Jack Crandall

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(Alumni News, continued from page 27)

in Florida. He focused on his own career in chemistry and the great personal benefits of general knowledge about chemistry. As he wrote, "the students seemed attentive and it was an interesting experience." We hope other IU chemistry alumni are gaining such experiences. He and his wife, Nadine, continue to live in Bradenton, Fla.

Jack H. Stocker, AM'47, was reported at the New Orleans ACS meeting to be a continuing member of the ACS Council Committee.

Rabin F. Sultan, PhD'86, is an associate professor of chemistry and chair of that department at the American University of Beirut in Lebanon. He teaches general and physical chemistry and conducts research in the areas of self-organization, pattern formation, and waves and oscillations in chemical systems. Sultan maintains ties with IU both through alumni and friends as well as scientific collaboration with professor Peter Ortoleva. He and his wife, Amal Abou-Hatab, also a chemist, have two sons.

Mansukhlal C. Wani, PhD'62, has been elected as the co-recipient of the 2000 Charles F. Kettering Prize of the General Motors Cancer Research Foundation for "contributions made to the diagnosis or treatment of cancer." The other recipient was the chief scientist, Monroe E. Wall, in the same program. Working together at the Research Triangle Institute for more than two decades, they were earlier "cited for the discovery of two chemotherapeutic compounds Camptothecin, and Taxol." In the major news release by the foundation concerning the recognition in 2000, it was stated in part that "[Wall and Wani] will share the foundation's Charles F. Kettering Prize, which honors the most outstanding recent contribution to the diagnosis or treatment of cancer, during a ceremony at the U.S. Department of State in Washington, D.C., on June 7." Referring to an interview for the press release, Wani stated, in part, "that the work of a cancer researcher doesn't end with one groundbreaking discovery. There is always a need to find something better and less toxic." At the time of this recognition, Wani was 75 and Wall was 83.

Professor Campaigne in a congratulatory letter on May 15, wrote to Wani:

"If you don't have one, better buy a tux with some of that money (a part of the prize). After the State Department dinner, there will be many more occasions you'll need it."

Peter G. Wolynes, BA'71, DSc'88, after leaving IU in 1971 received various earned and
25 YEARS AGO

Council Policy Committee and confirmed by the ACS Council at the August 1999 ACS meeting in New Orleans. This is for the 2000-2002 term.

Eric A. Maatta, PhD'81, a professor of chemistry at Kansas State University, Manhattan, has been honored by that university with the Commerce Bank Distinguished Graduate Faculty Award in recognition of his contributions to research and graduate education. His research interests are in synthetic inorganic and organometallic chemistry, catalysis and catalytic modeling, the functionalization of metal oxide clusters, and the preparation of hybrid organic-inorganic materials.

William G. Mays, BA'70, MBA'73, continues to be honored for his many accomplishments, having received an honorary ScD degree at the spring 2000 IU Commencement. He received a Madame C. J. Walker Life Time Achievement Award, as well as the United Negro College Fund Inc. Award.

Elsa Proehl Paulsen, MA'45, was the subject of an interview in the University of Minnesota's *Pediatric Alumni News* in fall 2000. She earned her MD at Minnesota in 1954. Paulsen credits her graduate work in biochemistry at IU with helping her to see research approaches to medical problems. Her master's research, conducted with Professor Emeritus Harry G. Day, resulted in publication in the *Journal of Biological Chemistry* in 1946.

David M. Ratzman, BS'89, MD'93, is an anesthesiologist and pain management physician with the Indianapolis Neurosurgical Group, Division of Spinal Diagnostics and Pain Disorders, in Indianapolis.

Michael J. Samide, PhD'98, who stayed for two years at Indiana University as a visiting assistant professor in general and analytical courses, began his own academic career at Butler University in Indianapolis in September as an assistant professor of chemistry.

Wilbur D. Shults II, PhD'66, received the Distinguished Service in the Advancement of Analytical Chemistry Award from the American Chemical Society, Division of Analytical Chemistry, at the New Orleans ACS meeting in August 1999. He is retired as a division director at Oak Ridge National Laboratory. Shults and his wife, Suereta, live in Oak Ridge, Tenn.

John W. Sloan, BS'39, is among the alumni who currently and significantly inform others on the roles of chemistry in life today as well as in professional careers. In 1999, he spoke to three different eighth-grade groups of students
The department had 44

faculty members 43 men and one woman (**Judy Harmony**) with **Eugene Cordes** as chair. Three of our faculty were in administration at that time: **L.L. Merritt Jr.** was special assistant to the president and dean of research coordination and development; **W.B. Schaap**, was vice-chancellor for administration and budgetary planning; and **V.J. Shiner Jr.**, was dean of the College of Arts and Sciences.

E. Campaigne

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(Alumni News, continued from page 28)

further academic experience and degrees were at Harvard, MIT, and in Germany. He was remarkably young when elected to membership in the National Academy of Sciences, and many other high distinctions have followed. Last year, Peter was an invited speaker at the 50th Anniversary Symposium of the Association of IU Chemists. His subject was "Protein Folding: Problems with Solutions."

2000 ACS 50-year members who received degrees in chemistry from IU

- Robert Emra Anderson, BS'49; MS'51
- Thomas F. Andrews, BA'42
- Frank Albert Guthrie, PhD'62
- Joseph R. Leal, PhD'53
- Chester Thomas O'Konski, graduate work '47-'49 (degree from Northwestern; came here with F.T. Gucker)
- Norman Paul Sweeny, MA'51

· James Van Verth, PhD'57

· Charles William Weber, PhD'53

· Raymond Sowinski, PhD'52

honorary degrees and other distinctions. In 1999, he was elected a fellow by the American Association for the Advancement of Science, "for fundamental studies of chemical physics, including reaction dynamics, the glass transition, and protein folding." Much of Wolynes' formal education was in the Gary, Ind., area, including the IU Northwest campus, thus only one year was needed at the IUB campus. His

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50 YEARS AGO

On Aug. 29, 1951, the first International Conference on Organic Sulfur Chemistry was begun at Indiana University in Bloomington, Ind. This was the first of a series of conferences on specialized fields of chemistry that the chemistry department was planning. At that time, the field of organic sulfur chemistry offered many exciting problems: Sulfa drugs still attracted attention; organic sulfonates were also attracting the attention of the detergent industries; penicillin, its structure recently elucidated, challenged the synthetic organic chemist; proper treatment of the disulfide bonds in human hair allowed permanent waves and easy shaving by chemical means.

The subject brought in plenty of industrial support, and the organizing committee **H.G. Day**, **F. Haurowitz**, **F.C. Schmidt**, and **E. Campaigne** as chair were able to raise sufficient funds to bring in a group of internationally known scientists in the field and an equally outstanding group of moderators.

It is interesting to note that the European Chemical Societies have recently organized a regular biannual conference on organic sulfur chemistry, but to the Indiana University Department of Chemistry belongs the honor of first recognizing this special discipline.

Professor **Frank Gucker** became dean of arts and sciences in 1951, and **Harry G. Day** became acting chair of the chemistry department. The use of stannous fluoride the product of research by **H.G. Day**, **Joseph Muhler**, and **William Nebergall** to prevent tooth decay was receiving a great deal of media attention in 1951.

E. Campaigne

Speakers at the Sulfur Conference in 1951

Front row, from left: Norman Kharasch, University of Southern California; Hans Heymann, University of Oregon; Francis Binkley, University of Utah School of Medicine; Marvin Carmack, University of Pennsylvania; Heinrich Hauptmann, University of Sao Paulo.

Back row, from left: John Sheehan, M.I.T.; F.G. Mann, Trinity College, Cambridge; E. Emmett Reid, Johns Hopkins University; H.J. Backer, University of Groningen; Claude Fromageot, University of Paris; F.G. Arndt, University of Istanbul; F.G. Bordwell, Northwestern; C.J. Cavallito, Irwin Neisler Co.



(Alumni News, continued from page 29)

the active practice of medicine in the Seymour community, where he was born in 1918.

Eleonor Harris Gucker, formerly of Bloomington, died on Oct. 16, 2000, in Columbia, S.C., at the age of 100. She was the widow of Frank Thomson Gucker Jr. (1900-1973), who had been chair of the chemistry department and dean of the College of Arts and Sciences at IU.

Herbert S. Gutowsky, BA'40, ScD'83 died Jan. 13, 2000. He suffered from diabetes and Parkinson disease. He and his developing family lived in Urbana, Ill., where he had served on the chemistry faculty at the University of Illinois in widely ranging capacities from 1948 until his death this year.

As was stated in a letter from the chemistry department at IU to then-President John W. Ryan: "Succinctly, Herb is widely recognized for his signal and pioneering achievements in the development and application of nuclear magnetic resonance spectroscopy to chemistry. The sweeping advancement through his work has led to a much clearer understanding of the structure of molecules and solids and better insight into intramolecular interactions. Of course he has made other significant research contributions and has been and continues to be a major leader in the chemical profession. Herb's scientific achievements have been so great that in 1977 he was awarded the National Medal of Science, this nation's highest recognition in science and engineering."

In an unpublished 42-page biographical sketch of long-time professor of chemistry at IU Frank C. Mathers (1881-1973), which is on file in the archives of the IU Department of Chemistry, an item on page 19 states:

"Dr. Herbert Gutowsky who has attained the highest recognition in science in this country wrote in 1978 'inherently, I am a problem solver, and Mathers in the old qualitative analysis course drove home to me the importance of careful observation of the choice and design of experiments in articulating the fact that chemistry is a science that deals with the reactions and properties of the real world.' "

C&EN of March 7, 1966, further illuminates Gutowsky's first 47 years of life in a report of the presentation of the Irving Langmuir Award in Chemical Physics, by Fr. John K. Wolfe, General Electric Foundation.

Greg Ernest Poirier, BA'86, died in September 2000 in Gaithersburg, Md., where he had lived since 1991, following the completion of

We have received notices of the deaths of several other alumni, but with no further information:

- **Sandra Leola Reese Barker**, BA'71, July 1999
- **Donald Kirby Barnett**, BS'38, March 2000
- **Christiana Elizabeth Lohrmann Broun**, BA'27, June 2000

- Eugene Colvin, BA'50, October 1999
- George R. Conn, BS'69, September 1999
- Paul James Dasher, MA'35, PhD'37, February 1997
- Basil J. Datzman, BA'86
- Gregory Alan Derringer, BA'86, August 2000
- Howard Neil Elsheimer, MA'53
- Max A. Fritz, BA'32, MA'34, April 1999
- Joe W. Garrison, BA'38, MA'40, January 2000
- Barbara Jane Sykes Goldsberry, BA'49, February 2000
- George Preston Gregory, BA'42, January 2000
- Phil Harter Hidy, BS'38, MA'42, PhD'44. September 2000
- Richard William Hobson, MA'39, November 1999
- Jim Samuel Jewett, BA'40, MD'42, May 2000
- Samuel Harrison Johnson, BA'55, November 1999
- Herbert L. Joseph, BA'38, MD'41, March 2000
- Sanford Allen Kaplan, BS'50, October 1999
- Edmund L. Keeney, BA'30, July 2000
- Walter J. Kleinschmidt, BS'40, May 2000
- Merle M Krider, MA'43, January 2000
- Mary Beatrice Jones Lingeman, BA'39, April 2000
- Bam Deo Mehrotra, PhD'64, died November 1999

Albert C. Yates, PhD'68, has attained distinction during the past decade through his presidency at Colorado State University since 1990. His background, experience, and accomplishments that led to the appointment are the basis in part for an extensive report by Natalie Meisler, a *Denver Post* sports writer, on Dec. 30, 1999. The report traces the life of Albert as a Southern youth and eventually his admission to graduate work in chemistry at IU. As the reporter stated: "Yates earned a doctorate in theoretical chemical physics from Indiana, then held faculty and administrative posts at several schools, including Indiana, Harvard, Cincinnati, and Washington, before coming to CSU in 1990. The University of Cincinnati named its graduate minority scholarship program for him and the Mountain West Conference created an annual award in his name. His daughter recently won a Yates fellowship in Cincinnati." The review reflects much on the merits and nature of this graduate from IU and for a brief time a member of the IU chemistry faculty. R.A. Bonham chaired Albert's thesis committee.

Necrology

Joseph M. Black, BA'41, MD'44, widely known and highly respected physician, died Dec. 20, 1999, at his home in Seymour. On Jan. 20, 2000, the *IDS* announced in bold headlines: "Former trustee and respected Indiana physician dies at 81."

This was followed by concise reports on interviews with various persons who knew the family doctor well. Although it was not mentioned in the *IDS* report, Black was a loyal and helpful alumnus of the Department of Chemistry.

Vice President and IUB Chancellor Kenneth Gros Louis said in the article that Dr. Black "was very important in developing the enormous medical school complex that now exists. He was devoted to IU, to the medical profession, and to his patients." Indeed, he served several terms on the IU Board of Trustees. Among his other responsibilities at the time of his death, Dr. Black was on

the board of directors of the IU Foundation and the board of governors of the Riley Hospital Memorial Association. Stemming from his interests and participation in athletics as an undergraduate while majoring in chemistry, Black was an honorary member of the Indiana Basketball Hall of Fame. All of this, and much more, did not keep him from

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(continued next page)

In memoriam: William LeSuer, PhD'48 (1920-1999)

Although the death of William LeSuer was reported last year, we are here including a more complete report on the scientist and his career, as written by Professor E. Campaigne.

The Association of Indiana

University Chemists will greatly miss Bill LeSuer, who died on Oct 14, 1999, at his home in Mayfield Village, Ohio. Bill had been very active in AIUC and departmental alumni affairs. He served as president of AIUC in 1955-56, was a speaker at the 25th reunion June 1980, and was instrumental in placing a Lubrizol Scholarship in the department in 1956 a benefit that has continued to the present. Bill received a Distinguished Alumni Service Award from the Indiana University Alumni Association in 1983.

LeSuer was born Oct. 13, 1920, near Pittsburgh, Pa. His father, a high school teacher, died when Bill was seven years old, and he spent much of his early years helping support his family with odd jobs after school. A good student, he won a scholarship and graduated with a BS in chemistry from Monmouth College in 1942. He held a Corn Products Research Fellowship at Indiana University in 1942-44.

He served on the P.T. boats in the Pacific as a lieutenant in the U.S. Navy for two years, then returned to IU as a teaching assistant in chemistry in 1946. Bill began his PhD research on thiophene chemistry with E. Campaigne and held the Sterling-Winthrop Research Fellowship in 1947-48. His PhD thesis in 1948 resulted in five U.S. patents and a clinically useful antihistamine. These patents were assigned to the IU Foundation.

In 1948, LeSuer joined the Lubrizol Corp. in Cleveland, Ohio, as an organic chemist working to develop new oil additives. In this he was very successful. His major inventions led to a large family of organic chemicals useful as dispersant-detergent additives in lubricants and fuels, and resulted in 102 U.S. patents assigned to the Lubrizol Corp.



The Midgely Award for Outstanding Contributions in the Field of Chemistry was awarded to William M. LeSuer by the Detroit Section of the American Chemical Society in 1973.

At Lubrizol, LeSuer rose rapidly: director of organic research and director of laboratories in 1955; assistant division head of research and development in 1960; and vice president of research and development and a member of the board of directors in 1969. He was awarded the Distinguished Scientist Award by Lubrizol before retiring in 1983.

Bill was active in his profession, as a member of the American Chemical Society, the Industrial Research Institute, and the Commercial Development Association. He was a member of Sigma Xi and Phi Lambda Upsilon and served on the Case Institute Engineering Advisory Committee. He was very active in educational affairs, as a member of the Martha Holden Jennings Foundation Advisory Board, the boards of trustees of Monmouth College and of Mount Union College in Ohio, the Grand River Academy, and the Richmond Heights Board of Education. With his wife, Arlene, he was also active in the Methodist church. He did missionary work in Africa and for the Red Bird Mission in Kentucky. He was active in the International Conference of World Affairs, the Euclid YMCA, and the East Shore United Methodist Church. Bill considered himself an avid fisherman, but a mediocre tennis and handball player.

Arlene preceded Bill in death on Sept. 18, 1999. She was his college sweetheart and worked in the bacteriology laboratories of

Leland McClung while Bill was on his second tour of duty at IU. At that time (1946-48), the bacteriology department was on the third floor of the Chemistry Building.

Both Bill and Arlene LeSuer were good friends to Indiana University, AIUC, and the Department of Chemistry, and we shall miss them.

***William and Arlene LeSuer
(Necrology, continued)***

- Salvador A. Pedicini, BA'38, MA'39, September 1999
- Frank Bigelow Pope, MA'36, PhD'40, November 1999
- John William Ripley, BA'42, MD'44, June 2000
- Morris Salzman, BA'41, MD'43, January 2000
- Herbert Arlington Sims, BA'40, January 2000
- Ralph C. Singer, BA'42, MD'44, September 1999
- William Clayton Stafford, BA'35, MD'39, November 1999
- Vern Forrest Steckley, BA'34, June 2000
- Robert A. Stewart,
BS'41, March 2000
- Michael Joseph Wheeler, BA'68, MD'71, April 1999
- Edward Jay Whitley, BS'69, PhD'73, August 1998
- Melville Yancey, MA'41, July 1999
- William Wolfgang Paudler, PhD'59, July 1998
- John Richard Maddox, BA'44, BL'49, April 1999
- Larry Lynn Moore, MA'55, January 1999
- John R. Morris, BA'33, MA'36, PhD'37, February 1995

Chemistry Honor Roll 1999

Mel E. Abascal

Robert L. Ake, BA'60

Timothy J. Anders, BA'89

Mark R., BS'83, & Ann Anderson

Anonymous

Donald R., D.P.M., BA'91, & Courtney A. Ansert

Burton L. Appleton, PhD'58

George R. Aronoff, M.D., BA'72

Peter G. Arvan, MA'44

William E., MA'50, & Mary E. Bacon

Kevin Baer, BA'86

Ann K. Bailey

Craig A., BS'70, & Margaret A. Balliet

Brenda G. Barker, M.D., BA'80

Helen B. Barnes, M.D., BA'38

John C. Bart, BS'89

Bradley B. Basinger, PhD'81

Thomas L. Baugh, BA'75

John C. Beauchamp, BA'86

Jean C. Beckman, PhD'77

Nicholas C. Bensko, MS'74

Ella M. Bettinger, BS'49

Lawrence A. Black, BS'77

Harold J. Blumenthal, BS'47

Alvin M. Borders, PhD'37

James A. & Deborah A. Borders

Carolyn A. Bovenkert, PhD'71

Max I. Bowman, PhD'37

Charles H. Boxman, BA'53

Wendy S. Braun, BA'93

Malcolm D., BA'38, & Mary E. Bray

William W. Bromer, PhD'54

William W. Brubaker, PhD'98

Robert R., BS'42, & Trudy Buck

Charles, BA'69, & Linda L. Bunnell

John E. Burks Jr., PhD'79

Gary W. Caldwell, PhD'82

Ernest E. & Jean Campaigne

Emily J. Canada, BA'70

William F. Carroll Jr., PhD'78

Ray F., PhD'72, & Lisa A. Childers, M.D., BA'70

Malcolm H. Chisholm

Grace P. Y. Chiu, postdoc'62

John W. Chung, BS'48, MA'49

Alan C. Clark, PhD'70

Richard E., MA'48, PhD'51, & Janet L. Cline

Lucinda Hittle Cohen, BS'89

Ronald W. Collins, PhD'62

Donald J., PhD'44, & Marion M. Cook

Tina M. Cooper, BS'92

Joan M. Coveleskie, MAT'79

Standiford H. Cox, BA'57

Jack K. Crandall

Arnold M. Crelier, PhD'71

Bradley J. Crofts

Leonard J. Czuba, BA'61

Ernest R., PhD'61, & Reba Davidson

Vincent J. Davisson, MS'83

Harry G. Day

Mark A., M.D., BS'77, PhD'81, & Jean Dayton

John B. Dennis, BA'36

Richard D. Di Marchi, PhD'79

Donald E. Dieball, PhD'57

Alan C. Dinner, PhD'70

Michael DiPierro, postdoc'84

Gerald E. Doeden, MA'50, PhD'65

Linneaus C., PhD'61, & Phae H. Dorman

Judith A. Douglas, MS'67

Melvin L., BS'62, & Judy B. Druelinger

LeRoy Jr., BS'37, & Dorothy E. Dugan

Milford E. Dulberger, BA'34

Merrill T. Eaton Jr., M.D., BA'41

Darrell D. Ebbing, PhD'60

Richard F. Ebeling, MAT'62

Marc S., M.D., BS'66, & Heidemarie E. Eisenberg

Leon, PhD'54, & Roslyn Ellenbogen

Michael F., BA'69, & Christine C. Elmore

Maria M. Ferreira, PhD'97

James P. Ferris, PhD'58

Lynn A. Fesenmyer, M.D., BA'89

Virginia Folkerth, BA'46

Charles F., M.D., & Orpha D. Ford, BS'45

Otis W., BS'40, & Eula L. Fortner

William O. Foye, MA'44, PhD'48

John D., M.D., & Martha J. Franz, M.D.

Elizabeth W. Fraser, BA'42

Charles E., BS'47, MA'48, &
Evelyn S. Frohman, BS'43

H.R. Froning, MA'44, PhD'49

Joe W. Garrison, BA'38, MA'40

Wilbert W. Jr. & Mary Kratz Gasser

Ytbarek Gebre-Egziabher, M.D., BA'55

Katy E. Georgiadis, BS'86

Robert W., BA'92, & Amy J. Gilkison

Robert H. Gillespie, BS'38

Charles T. Gnewuch, PhD'66

Carl W., BA'55, & Patricia Golgart

Raymond A. Grant, BS'75

Rachel A. Gratz, PhD'81

Benjamin Greenberg, BA'36

Charles H., BS'48, MA'54, & Gloria J. Griffith

Charles J. Guare, PhD'53

Charles W. Gwaltney, BA'63

Robert M. Haag, PhD'52

Larry, MS'75, & Sue Hammersley

Nancy J. Harrison, BA'56

Russell H. & Mary Hart, MAT'56

Joseph V. Hartman Jr., BS'38

Robert L. Hays, MS'79

Scott J. Hein, BS'82

Sue Henry

Albert L. Hensley Jr., BS'51

Rayna S. Herman, BA'91

Gary M. & Susan Hieftje

Clarence J. Hochanadel, MA'41, PhD'43

William Hodes, BA'50, PhD'52

Zachary I. Hodes, M.D., BA'72

John D., M.D., BA'81, & Stacie D. Howard

Jonathon O. Howell, PhD'85

Lee M. Hubbell, MS'70

James L. Hudson, BA'54

John C., BS'64, MS'67, PhD'74, & Carolyn J. Huffman, BA'64

Suzanne S. Huizinga

Ross A. Hyman

David B., M.D., BA'85, & Patricia L. Janizek, M.D., BS'86

Glen J. Jarboe

Alex R. Jeffcoat, PhD'69

Celia Jenkins, BA'88

Maynard A., BA'68, & Barbara E. Johnston

Hugh W. Johnston, PhD'68

John R. Kagel Jr., MS'83

Alan B., M.D., BS'84, & Patricia N. Kaiser

John T. Karich, BA'87

Jerry P. Keilsohn, MS'82

Robert J. III, BS'68, & Judith R. Kelly

John R., M.D., & Wendy L. Kindig, M.D., BA'73

John H. Kindsvater, PhD'71

Franklin S. King, BS'37

Gerald E. King, BS'39

Peter F. King, BS'51, MA'52

Tadeusz E., BA'77, & Juedi Kleindienst

Iris J. Klinkenberg

Philip A. Kluft, BS'53, MA'55

Robert C. Klute, BA'82

Frank H. Kratli, BA'32, MA'33

Stanley W. Jr., BA'32, MA'33, & Jane C. Kraughs

William E. Kreighbaum, PhD'60

Paul E., MS'65, & Barbara J. Krieger

George S. Kriz Jr., PhD'66

Guenter H. Kuehl, postdoc'57-'59

Michael J. Kunka, BA'88

Ellen J. LaBelle, M.D., MS'70

Elma J. Lanterman, MA'48, PhD'51

Daniel M., PhD'78, & Leona M. La Perriere

Joseph E. Lauer, M.D., BS'91

Jeanette M. Leahy, BA'79

Joseph R. Leal, PhD'53

Kristin J. Leckrone, PhD'97

Edith S. Lessor, PhD'55

Larry, PhD'80, & Ricki A. Lewis

Ronald G. Lewis, PhD'66

James M. Light, M.D., BA'64

Luan-Ho C., PhD'67 & Cheyeh Lin

Ted J., BA' 53, & Ruth A. Logan

Andrew Loh, BS'71

Vida Trafford Lohnes

Warren H. Machleder, PhD'68

Larry N., BS'71, & Amy A. Mackey

Joseph A. Madri, M.D., PhD'73

Wayne S. Mahoney, PhD'89

Mary K. Mahony, PhD'91

(continued on page 34)

Report from the Financial Advisory Board

Maximize giving by planning ahead

Each year in the fall, generally on a Friday

before a football weekend, the department's Financial Advisory Board meets for a working luncheon in the Indiana Memorial Union. The board was initially formed by **Adam Allerhand** in 1979, who, as chair of the department, recognized the importance of planning for the future financial aspects of various departmental functions, ranging from visiting lectureships, faculty and student recruiting, student awards, and fellowships. The board consists of the chair, three active or retired chemistry faculty members, three chemistry alumni or benefactors, the immediate past chair, and the associate chair. The chair appoints all members for a three-year renewable term.

Recent alumni or benefactors who have served include **Nolan Sommers, Bill LeSuer, Max Marsh, Charles Paget, Lin Dorman, and Allen Siedle**. Their counsel and support of the department is gratefully received and at the last meeting I asked Lin Dorman to comment on "planned giving" and how we could be sure to present our best case for alumni giving in the face of the many worthy charitable requests each of us receives annually. The following is Lin's response, edited for this publication.

Planned giving has become a rapidly growing cottage industry fueled by the reality that about 10 trillion dollars will be flowing from the current generation to the next. Thus, organizations that rely on charitable giving are gearing up to get as big a piece of the pie as they can. There is a National Committee on Planned Giving, whose Web site is www.ncpg.org, there is a journal, Gift Planning, and there was a White House Conference on Philanthropy that could be viewed around the country last October 1999.

There are many mechanisms for giving, but I believe these should be left to the experts in our case, the College of Arts and Sciences' development office and the IU Foundation. I believe we should be about directing gifts to the university to the chemistry department. To that end, a strong case for giving to chemistry needs to be developed, aside from loyalty. Why do we need the money? How would it make us a better department? What impact have recent gifts made on the department, e.g., professorships, lectureships? What are some of the department's long-range goals, e.g., acquiring specialized, expensive pieces of equipment? What is our current standing among our peers, other Midwestern research universities? How might our standing be improved? When the standing of the department is raised, the standing of alumni is raised because they feel they are a part of that, and I believe, will give to that end.

Here is one other bit of practical advice appropriate for chemistry alumni who might give securities or bonds instead of cash:

Suppose your grandmother gave you shares of Cream and Crimson Ltd. years ago, and these have appreciated substantially in value over the years. Now you want to sell them and contribute the proceeds to IU's Department of Chemistry. If you did this, you would first incur a large capital gains tax substantially diminishing the amount of your gift. A much better alternative for you and the department would be to give the stock to IU (for the department) and let them sell it. The school retains the full value of the sale and the donor gets tax credit for the full value of the sale without a capital gains tax liability.

On behalf of the department and by that I mean faculty, staff, graduate students, and undergraduates, I want to thank all of you who have given over the past years and to encourage you to continue to support us. If you have not yet given, then I suggest that you think about how the chemistry department served your needs in getting started in your career and consider giving. The moneys from the Friends of Chemistry and related chemistry endowments make this department tick by providing endowments for professorships and research, undergraduate and graduate prizes and fellowships, visiting lectureships, staff recognition awards, the annual magazine, and special events such as our recent celebration of the 50th anniversary of the establishment of the Association of Indiana University Chemists.

Malcolm H. Chisholm



Lin Dorman

(Chemistry Honor Roll, continued from page 32)

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(Necrology, continued from page 30)

Frank J. Welcher, BA'29, MA'30, PhD'32, died Aug. 15, 2000. He assisted in teaching chemistry while he was a graduate student, largely under the supervision of Professor H.T. Briscoe, who had completed his graduate work in the same department in 1924. Welcher was appointed to the faculty at the IU Extension Center in Indianapolis in 1932. During the years ahead, when the center was expanded and later joined with a center organized by Purdue to become Indiana University Purdue University at Indianapolis, he continued on the faculty. In 1978, Welcher retired and a celebration of his service "49 Years of Teaching and Research in the Indiana University System" was held in the IU Union Building on the Indianapolis campus.

Following his retirement, Welcher turned his attention to an intensive preparation of a book about the Union Army and, as related in an Indianapolis newspaper on Sunday, Jan. 27, 1990, "the 17 years produced a 1,064-page Union Army encyclopedia." The reporter for the feature article was Mary Wade Atteberry.

Elizabeth Greene and Harry G. Day

his graduate work in Texas. He had joined the National Institute of Standards and Technology, where he soon became a chemist in the Process Measurement Division. One of his colleagues wrote, "He was a bright youngster with much potential. He did some of the most outstanding research on the properties of self-assembled monolayers using scanning tunneling microscopy and other techniques." The appraiser added that Greg had "received the 2000 Sigma Xi Young Investigators Award just recently, and stating in addition that "we will all miss him, his challenging intellect, and his sense of humor."

It should be noted that in his undergraduate work before going to Texas for his doctoral, Greg worked in the laboratory group of Distinguished Professor Gary Hieftje.

Jubran M. Wakim, PhD'65, died of cancer in Murfrees-boro, Tenn., in March 2000. He had been a member of the chemistry faculty at Middle Tennessee State University since 1988. His widow, Dr. Judith Wakim, is a professor of nursing at MTSU. Jubran had taught chemistry at University of Tennessee Martin for 20 years before he changed to MTSU. At each institution he had devoted much time to pre-med advising. In reflecting about her late husband, Judith Wakim noted that "his love of teaching showed in every class. He was extremely organized and presented the overwhelming material in a clear, concise, manner."

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