# IU • CHEMISTRY

# **Pursuing Proteomics**

#### by Jack Crandall

Jack Crandall did a noble job putting the following story together, but we would be remiss if we did not acknowledge the significant contributions of David Clemmer, Milos Novotny, and Jim Reilly, as well as Randy Arnold.

- Rupert Wentworth

roteomics, a new field that comprises the examination of all of the proteins expressed by a genome and their additional modifications, is a natural follow-up to the Human Genome Project that has captured so much attention recently. Scientists who pursue the study of proteomics are interested in the protein complement of living cells, including variations among different types of cells in an organism, localization within a cell, interactions with other cell components and differences between healthy and diseased cells, as well as changes associated with cell development, to name but a few aspects of current interest. Clearly, the proteome presents a much more dynamic and complex system for analysis than the genome, so that the chemistry associated with it holds great potential for advances in our understanding of living systems and, most importantly, for applications in medical science. Our Department of Chemistry has now joined others in this exciting endeavor. Many of

you may have seen the article in the April 8 issue of *Chemical and Engineering News*, which features comments from professors David Clemmer and Milos Novotny at a symposium on applications of chemical microinstrumentation in proteomics at the last PITTCON.

The rapid inception of research at the IU Department of Chemistry in the field of proteomics is founded on the traditional research strengths of the department in analytical chemistry, particularly instrumentation and bioanalytical methodologies. As usual, the superb technical services of the department have had a major role in this process: the mechanical instrument service, research computer services, and electronic instrument service shops are especially critical to proteomics research. Professors Clemmer, Novotny, and Reilly have pooled their talents and expertise to establish a comprehensive, interactive, multidisciplinary program in proteomics. Not surprisingly, the focus of this joint effort is the development of bioanalytical methodologies and instrumentation to deal with the incredibly complex array of proteins in living cells in both a qualitative and quantitative manner. At this time, this typically involves isolation of the cell proteome, digestion of the protein mixture (usually with trypsin) to give an even more complex mixture of peptides, (continued on page 2)

IN THIS ISSUE ...

WE TELL YOU HOW THREE PROFESSORS POOLED THEIR TALENTS TO ESTABLISH A MULTIDISCIPLINARY PROGRAM IN PROTEOMICS.

VIC VIOLA EXPLAINS THE FACTORS THAT MOTIVATED HIS MOVE FROM MARYLAND TO IU IN 1980.

We describe Harry Day's significant contributions to the work that made Crest toothpaste possible.

Guest author lyman R. Caswell reflects on his life as a student of Frank Mathers.

### **Pursuing Proteomics**

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and then subjecting this to the crucial separation and identification process. The data so obtained are analyzed to reveal the structures of the original proteins in the proteome with the aid of computational analysis and the use of standard literature databases of proteins. Thus, proteomics research puts a huge premium on both the sensitivity and through-put of the modern bioanalytical chemistry and on the processing of experimental data.

Research collaborations of the principal investigators in Chemistry with groups in Biology and the School of Medicine, as well as those at other universities are already underway and this type of interdisciplinary work can be anticipated to expand rapidly as the proteomics program grows to maturity. With the substantial infrastructure resources for this research currently being put in place, other chemistry faculty members can be expected to join this core unit in the future as their own research expertise and perspectives are applied to problems in proteomics. In addition, a



Graduate student Jon Karty measures the flow-rate in the source of the LCQ ion trap mass spectrometer.

national search is currently under way for new faculty members who can tie their interests to proteomics in bringing additional energy and breadth to the program.

A focal point for the implementation of proteomics research in the department is the newly created Proteomics Research and Development Facility (see also http://php.indiana.edu/ ~ rarnold/PRDFhomepage.htm), which will serve as a key resource for the diverse interdisciplinary projects in proteomics that are taking place now, as well as those that will be pursued in the future. This new laboratory will ultimately house a comprehensive array of commercial and homebuilt, state-of-the-art instruments to provide the modern technology in separation sciences and mass spectrometry that has become standard for unraveling the proteome. The function of this new laboratory is to forge new, interdisciplinary research partnerships rather than providing routine protein analysis. Thus, the focus will be on the development of new methodology and instrumentation to advance proteomics research.

Professor Milos Novotny has been selected to serve as the first director of the facility. The installation of equipment and day-to-day functioning of the lab is being overseen by Randy Arnold (PhD'99, Reilly), who rejoined the department in July as an assistant scientist and manager of the facility. Randy was attracted back to IU after three years as an assistant professor at Huntingdon College by the opportunity to be involved with cutting-edge research in proteomics because, as he puts it, "the chance to work in this fast-growing and fascinating field was simply too tantalizing to let pass by."

While still in a construction mode, impressive progress is being made in the installation of key instrumentation in the facility. A new ThermoFinnigan LCQ DECA XP ion-trap mass spectrometer has been set up, and the Novotny group has coupled it to a home-built capillary electrochromatography unit. The LCQ is currently being interfaced to an LC Packings nanoLC unit for high-sensitivity peptide analysis. A Micromass CapLC-QTOF quadrupole/time-offlight (TOF) mass spectrometer system is available for quantitative peptide analysis at high resolution. Both of these spectrometers can be used for MS/MS experiments that are extremely useful for peptide sequence determinations. The most recent addition is an applied biosystems proteomics analyzer, which is a MALDI//TOF/ TOF instrument for MS/MS analysis of peptides. An ÄKTApurifier, a system for high performance purification and characterization of peptides, is also available, as are two Dionex Summit HPLC systems for protein and peptide purification. Finally, a prototype ion mobility-TOF spectrometer developed by the Clemmer group and constructed in the department has been donated to the facility. This instrument provides the advantage of direct separation and analysis of complex mixtures in the gas phase.

The funding for the new facility is only a small part of the Indiana Genomics Initiative (INGEN; www.ingen.iu.edu), which is a major IU undertaking funded by a \$105 million grant from the Lilly Foundation, the largest single grant ever awarded by Lilly Foundation or received by IU. This program is centered around the IU School of Medicine in Indianapolis, but also involves significant participation by units in the biology and chemistry departments on the Bloomington campus.

Another important source of financial support for proteomics research is the Indiana Proteomics Consortium, which is part of the Life Sciences



Jack Crandall

Initiative, a research partnership of IU, Purdue, and the Lilly Corp. The long-range goal of this initiative is to provide the basic technology for the development of new high-tech industries in our geographical area. It is noteworthy that professors Novotny and Reilly are principal investigators on the first two grants awarded for proteomics projects at IU.

Professor Novotny has been especially active in developing collaborative efforts with research groups at the School of Medicine in Indianapolis. He emphasizes the direct connection between chemistry and medicine and notes that proteomics provides a vital link between the two. His research group is involved in separate collaborations concerned with the molecular basis of alcoholism, cancer research, and endocrinology and metabolism. In association with professors T.-K. Li and William McBride at the School of Medicine, they are trying to understand how long-term alcohol consumption in genetically selected (alcoholpreferring) rats causes brain damage and other adverse metabolic effects. Collaborations with several School of Medicine investigators concentrate on the role of glycosylated structures (a longstanding interest of the Novotny group) as disease markers in cancer investigations. The ultimate goal of the endocrinology and metabolism area of research association, which is still in a developmental stage, is to provide a better understanding of metabolic disorders, such as diabetes and its links with cardiovascular diseases using proteomics-based inquiries. Thus, the skill and knowledge of the Novotny group in separation science is being applied to important biomedical problems.

Professor Clemmer's group has been widely recognized for their work in developing gas-phase

ion-mobility techniques for the study of biomolecules and has demonstrated its use in the analysis of highly complex peptide mixtures (see cover). In this approach, a packet of ions is introduced into a defined pressure of buffer gas and subjected to a weak electric field. As the packet of ions travels through the gas, ionic species are separated based on differences in their mobilities. Crucially, mobility-based separations can be carried out on the millisecond timescale. which is intermediate between the seconds to minutes of traditional condensed-phase separations and the microseconds required for analysis in a TOF mass spectrometer. Thus, this technique can be combined with powerful LC-MS approaches in proteomics research. With a recent significant breakthrough increasing the sensitivity of the method by a factor of about 100, the technique permits the analysis of extremely complex peptide mixtures from whole cell digests to be carried out in a single experimental sequence. This greatly improved modification enabled a collaborative project with Novotny and Professor Peter Cherbas in the Department of Biology that couples capillary liquid chromatography with the above instrumentation to examine the proteome of the Drosophila fly as a function of hormonal stimulation (see also www.indiana .edu/~ clemmer/).

Professor Reilly and his group are also engaged in developing new research tools to advance proteomics research. They are especially interested in the application of MALDI (matrix-assisted laser dissociation/ionization) techniques for ion formation and TOF mass spectrometry in conjunction with 2-D gel separations of peptide mixtures from protein digests. Derivatization of these mixtures by guanidination of lysines has been found to yield significantly enhanced MALDI signal intensities in addition to information about the number of lysines present in each peptide. They have written a computer program (PRODIGIES) for the automated identification of proteins from this type of polypeptide mass mapping data. MS/MS technology with intermediate photofragmentation is also being developed for polypeptide characterization. An interdisciplinary project with Professor Yves Brun in the IU Department of Biology involves following the proteome of Caulobacter crescentus bacteria as the cell morphology changes during its life cycle. Another project, in collaboration with Professor Fred Sherman at the University of Rochester, examines post-translational modifications in the ribosomal proteins of genetically modified yeast. Reilly marvels at how far his research has diverged from his early work in gas phase laser spectroscopy to the multi-disciplinary field of proteomics (see also www.indiana.edu/~reillyjp/).

Clearly, the IU Department of Chemistry is well on its way to becoming an important center for proteomics research that you will be reading about in the years to come. Mobility-based separations can be carried out on the millisecond timescale, which is intermediate between the seconds to minutes of traditional condensed-phase separations and the microseconds required for analysis in a TOF mass spectrometer.

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# Department welcomes new faculty, new initiatives

It is my pleasure to announce the creation of two new chemistry awards — the **Dennis G. Peters** Undergraduate Scholarship and the **Jack K. Crandall** Award in Graduate Education. Both awards were endowed by friends, colleagues, and former students. The Peters' scholarship is in celebration of 40 years of teaching and research excellence and service to our department. Dennis has held the Briscoe Professorship in Chemistry and has had his heart in our undergraduate



David E. Clemmer

program during his entire career at IU. He is currently working on our freshman courses with Professor Emeritus Adam Allerhand. The Jack K. Crandall Chemistry Award in Graduate Education was established on the occasion of his retirement. This said, Jack's experience as associate chair of our department for many years has led us to bring him back in an advisory role. Both are endowment funds that will exist in perpetuity and will make a big difference to our students in the future. Thank you all for your kindness and generosity!

During the past year we have added five new faculty members. We persuaded **Martin Jarrold**, the Dow Professor of Chemistry at Northwestern University, and **Caroline Chick Jarrold**, who recently received tenure at the

University of Illinois at Chicago, to move to Bloomington and strengthen our physical and analytical divisions. They arrived in Bloomington with their two sons (Gordon and Edward) during the spring and are in the process of setting up major machines and instruments in their laboratories. Martin's research interests include the study of clusters, nanomaterials and surfaces, as well as biophysics of unsolvated peptides and proteins. Caroline's group uses a combination of techniques including laser ablation, photoelectron spectroscopy, and time-of-flight measurements to study fundamental properties of clusters. She is currently studying the structures of products of gas-phase reactions between metal and metal oxide clusters with a variety of organic molecules. It is a treat to welcome them to Bloomington, and they have mentioned they are enjoying the community and the lifestyle here.

One of Caroline's first suggestions for our department was that we hire one of her collaborators — the renowned theorist **Krishnan Raghavachari**, previously a distinguished member of the technical staff at Agere Systems/ Lucent Technologies (Bell Laboratories). Krishnan joined our department in August and is still in the process of settling into Bloomington. His research interests range from the fundamentals of electron correlation theories to applications of quantum chemistry to semiconductor materials and nanotechnology (see also "Faculty News").

Assistant Professor **Daniel Mindiola**, an organometallic chemist, began setting up his new laboratory in July. Prior to joining our department, Dan was a postdoctoral fellow at the University of Chicago with Gregory Hillhouse and obtained his PhD from MIT under Chris Cummins. Although Dan has only been in Bloomington a few months, he has already won a national award (see "Faculty News") and has made substantial progress in his lab. His research interests cut across the fields of synthetic and mechanistic organometallic chemistry.

Finally, **Jill Robinson** joined our faculty as a lecturer. Prior to coming to IU, Jill was an academic professional lecturer in analytical chemistry at the University of Wyoming. Jill obtained her PhD from the University of Colorado, where she worked with John Birks, and she has interests in atmospheric chemistry and analytical chemistry.

Several important new initiatives are likely to influence the department for many years to come. The first has been the creation of a proteomics center for advancing bioanalytical technologies. The center was initially founded from funds obtained from the Indiana Genomics Initiative (INGEN) in collaboration with scientists at the medical school in Indianapolis and other departments in Bloomington and is directed by **Milos Novotny**. Professors Novotny and **Jim Reilly** have extended their presence in the community by becoming founding members of a Proteomics Consortium — a part of the Indiana Life Sciences Initiative.

Subsequently, **Peter Ortoleva** has founded and become the director of the Center for Theoretical Virus and Cell Modeling, which also folds into this initiative. The main goal of the life sciences initiative is to capitalize on high-tech opportunities for Indiana. These initiatives and others,

including the Gill Center, as well as efforts from scientists across our campus, will eventually lead to a new multidisciplinary science building that will be located between the Chemistry Building and Myers Hall. The building is in the design stage, and I've been informed that we should break ground in the spring. Although issues such as how much of the building will be underground and how the building will be connected to the Chemistry Building remain unresolved, it is clear that the building will allow for significant space to grow new initiatives in the Department of Chemistry. If this all sounds exciting, it is. We capitalized on the excitement by hiring Randy Arnold (PhD'99, Reilly group) away from Huntingdon College as the chemistry department manager in the Proteomics Research and Development Facility. Additionally, we hired Kirk Boraas (PhD'93, Reilly group) from a teaching position at Minneapolis Community and Technical College as a member of the Indiana Proteomics Consortium project. Both hold the rank of assistant scientist.

Many of our faculty have received major university and national awards since our last issue of IU• Chemistry. Ernest R. Davidson received the 2001 President's National Medal of Science at the White House on May 29. The 86th Congress established the National Medal of Science in 1959 as a Presidential Award to be given to individuals "deserving of special recognition by reason of their outstanding contributions to knowledge in the physical, biological, mathematical, or engineering sciences." In addition. Ernest received the College of Arts and Sciences 2002 Distinguished Alumni Award, which was presented on Oct. 25. The award, established in 1978, acknowledges the outstanding accomplishments of College graduates who have used their education as a springboard to success in teaching, government service. the corporate world, nonprofits, or the entertainment field. Recipients not only must be at the top of the chosen profession, but they must take an active role in making the world a better place. I had the pleasure of Ernest's company at the award ceremony and found his acceptance speech to be inspiring. I particularly liked one comment. Ernest noted that his scientific life was a result of the generosity of the taxpayers and that he had not felt like he had done a day's work in his life until he became the chairman of chemistry (research and teaching had been fun, not work). I too have come to appreciate the joy of spending a day in the laboratory as a professor. We are all very proud of Ernest and the exceptional example that he has set for us.

Keeping with this tradition, **Andrew Evans** received the 2002 Pfizer Award for Creativity in Organic Chemistry sponsored by Pfizer and Warner Lambert. This award was given to members of the synthetic organic community who have distinguished themselves through significant creative contributions to the area of organic research and through excellence in graduate student training. **Andrew Feig** received a 2002 Cottrell Scholar Award from Research Corp. for outstanding achievements in teaching and research. **Daniel Mindiola** received the 2002 Camille and Henry Dreyfus New Faculty Award. This award was designed to assist outstanding scientists to realize their promise as educators and is given to support new faculty with research. The Student Alumni Association honored **Martha Oakley** with the Student Choice Award for Outstanding Faculty. This award was given based on Martha's excellent teaching abilities and the impact that she had made on her students.

Dennis Peters received the 2002 Henry B. Linford Award presented by the Electrochemical Society at its October meeting in Salt Lake City. The award honors outstanding achievement in the teaching of chemistry. Earlier in the year Dennis was awarded the Brown Derby Award sponsored by the Indiana University Society of Professional Journalists. This award is given to a faculty member who is deemed outstanding and popular with his or her students and who merits their highest respect. David R. Williams was the recipient of the 2002 Tracy Sonneborn Lecture Award. This award is given to faculty members who have achieved local, national, and international distinction in both teaching and research. David presented the Sonneborn Lecture in the Whittenburger Auditorium on Dec. 9. Finally, in April Gary Hieftje, Cathrine Reck, and John Richardson received Trustees' Teaching Awards, established by the IU Board of Trustees in recognition of classroom excellence. Courses taught, course enrollments, and student evaluations provided the principal basis for selection. Congratulations to all of our award winners for their recognized excellence!

There have been a number of changes in our faculty in recent months. **Martin Stone** and **Jeff Zaleski** were promoted to the associate professor rank with tenure, and **Romualdo de Souza** and **Josef Zwanziger** were promoted to the rank of full professor. Congratulations! Unfortunately, **Shuming Nie** accepted a position at the Emory University School of Medicine, and **Glenn Martyna** moved to IBM. Also, we say farewell and thank you to **Ernest Davidson**, who retired following the last academic year after many years of service to our department.

In closing I'll note that our department and university continue to face uncertain and challenging times. We are still faced with an age distribution and national and state economies that would make even the most steady of chairs uneasy; additionally, we've just learned that President Brand will step down in order to lead the NCAA. In such times we are especially appreciative of the support of our alumni and are always delighted to hear from you.

— David E. Clemmer

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The main goal of the life sciences initiative is to capitalize on high-tech opportunities for Indiana.

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# AROUND IU • CHEMISTRY

# **Southern Indiana Section ACS activities**

The SISACS hosted a seminar in Indiana University's chemistry department on Feb. 14. Professor R. Paul Philp from the School of Geology and Geophysics at University of Oklahoma, Norman, Okla., was the invited speaker. His talk, titled "Development of Analytical Techniques Used in Organic Geochemistry," gave an overview of the problems that transpire in the oil industry when oil spills occur. His seminar included how to determine forensically who is responsible for oil contaminations and who should be responsible for the cost of clean up. We had a good turn out for his talk from both chemistry and geology departments.

ACS past-president Dr. Helen Free visited the IU campus as a SISACS guest on May 8. She gave an



Helen Free

insightful seminar pertaining to the history, development, and use of simple diagnostic tests in the evaluation of diseases. Free is presently a consultant for Baeyer Corp. in Elkhart, Ind.

Every year, SISACS gives an award to an "Outstanding Undergraduate in Chemistry" during the department's honors banquet ceremony. The recipient for 2002 was **Anna Krauze**, who graduated from IU in May with highest honors.

The section proudly sponsors National Chemistry Week (NCW) to enhance the public's awareness of the wonderful contributions of chemistry. Starting in 2003, NCW will be celebrated during the fourth week of October (Oct. 20–26) instead

of the customary November time period. This year's theme was "Chemistry Keeps Us Clean." The annual NCW event unites ACS local sections, industries, schools, and individuals in communicating the importance of chemistry to the quality of life. NCW is a community-based program that is run by the local ACS sections. Our section offered a series of activities, including chemical demonstrations, hands-on activities for kids and families, contests and games, Boy Scout merit badges, poster competitions for students from elementary school to high school, and an open house, including tours of the Chemistry Building at IU Boomington. Our finale was a wellattended magic show presented by **Alice Dobie-Galuska** and **Jill Robinson**. We habitually have a strong turnout from the area schools, and many educators incorporate NCW into their curriculum.

The SISACS is actively planning for the 2003 National Organic Symposium that will be held June 8–12 at IUB. Members of the section have been asked to participate in staffing information booths, acting as campus guides, running various activities such as a Gold tournament, a 5-K run, and helping to set up and clean up after the Symposium Dinner on June 11.

TGIF "Wine and Cheese" receptions in March and June were sponsored by SISACS. The functions were held in the University Club of the Indiana Memorial Union. Both TGIFs had good turn outs of about 50 people. We are trying to host monthly TGIF gatherings commencing in the fall. The SISACS hosted a Night at Victory Field to watch the Indians play in Indianapolis in July. Furthermore, the SISACS hosts a very popular golf scramble in July or August at the local Indiana University facility. The section also sponsored a reception in conjunction with the summer undergraduate research poster display in August.

The SISACS has been undertaking some fundraising strategies to ensure that our local section can maintain the money necessary to pursue our chapter goals. We have been offering two different types of T-shirts highlighting "Indiana University Chemistry" that have been selling well. Over 30 T-shirts found their way to China during a recruiting trip, and T-shirts were also given as gifts to the student visitors during the recruiting weekend. Professor Dennis Peters generously rewarded his students who received perfect scores in his General Chemistry II C106 class with stylish ACS T-shirts. Furthermore, we were selling the beaker mugs (with no specific decal) that students love and love to give as presents. The T-shirts sell for \$15 each, and the beaker mugs sell for \$10 (350-mL) and \$12 (600-mL).

For the calendar year 2002, **Kevin Gilbert** is the chair, **Rick Mullins** is the chair-elect, **Kate Reck** is the secretary, and **Dan Gurnon** is the treasurer. Further positions are held by **Tim O'Dea**, the National Chemistry Week coordinator, and **Mark Herbert**, who is the membership chair. **Steve Wietstock** remains our career services coordinator, and Professor **Jeff Zaleski** is our local section councilor.

### LECTURE SERIES, SPECIAL LECTURES, & SYMPOSIA

#### **Invited Lecture Series**

The current series of invited lectures began on Oct. 24, 2001, with a presentation by Professor **Al Burlingame**, titled "Mass Spectrometry and Opportunities in Proteomics: Studies of Proteins and Protein Machines," an Eli Lilly Distinguished Lecture. Burlingame has been the director of the Biomedical Mass Spectrometry Resource in the School of Pharmacy at the University of California, San Francisco, and a visiting professor at the Ludwig Institute for Cancer Research in London; recently, he was appointed professor of biochemistry at University College in London. He has been deputy editor of *Molecular and Cellular Proteomics* since 1999 and is the author of more than 480 publications and books.

#### **Computational Chemistry Distinguished Lecture**

On Nov. 7, the Computational Chemistry Distinguished Lecture was given by **Weston Thatcher Borden** of the Department of Chemistry, University of Washington. Professor Borden has received several awards for his research and has served on several editorial advisory boards; he is currently an associate editor of the *Journal of the American Chemical Society*. His subject was "Theoretical Solutions to Experimental Puzzles in the Chemistry of Phenylnitrene and Derivatives — What Accounts for the Many Differences Between Phenylnitrene and Phenylcarbene?"

#### **Special Lecture**

Professor **Christopher A. Reed**, University of California at Riverside, discussed "Strong, but Gentle Superacids" at a special lecture on Feb. 20. The conjugate acids of icosahedral-shaped carborane and similar anions are superacids (i.e. stronger than pure, anhydrous sulfuric acid); at the same time, they are among the least corrosive and least destructive ones. Reed received his BS and PhD degrees from Auckland University, New Zealand. He has been a Sloan Fellow and has won a Dreyfus Teacher-Scholar Award.

#### **Raymond Siedle Lecture**

The 2002 Raymond Siedle Lecture was given by Professor Dr. **Konrad Seppelt** on April 17. His subject was "Gold, Xenon, and Other Noble Cations." Seppelt obtained his PhD degree at the University of Heideberg in 1970. He has been a faculty member at the Freie Universität Berlin since 1980, where he has served the administration both as dean and vice president. His research has been concerned mainly with fluorine chemistry; one of his aims has been to make compounds that were thought not to exist.

Ten years ago, the Raymond Siedle Lectures were established to honor the contributions and memory of the father of **Allen Siedle**. Allen received his PhD degree from Indiana University in 1973.

#### **Gill Center Lecture**

A Gill Center Lecture was presented on May 29 by **D. Allan Butterfield**, professor of chemistry and director of the University of Kentucky Center of Membrane Sciences. His topic was "Oxidative Stress and Neurodegeneration of Alzheimer's Disease Brains: Central Role of Amyloid Beta-Peptide 1-42." This ongoing lecture series was established through a gift from Linda and **Jack Gill**, PhD'63.



Weston Thatcher Borden



Christopher A. Reed





Konrad Seppelt

D. Allan Butterfield

# Symposium held in honor of Adam Allerhand

Following Professor Adam Allerhand's retirement in 2001, a symposium was held in his honor on Jan. 30, 2002. Introductory remarks were made by Jeffrey Alberts, associate vice president of Research and the University Graduate School, as well as comments from professors David Clemmer and Milos Novotny. The latter also discussed some of his current research.

Former student **Eric Oldfield** of the Center for Biophysics and Computational Biology, University of Illinois, discussed "NMR Studies of Biological Systems." Novotny's

topic was "Bioanalytical Investigations of Glycoprotein Structure." Steven Maple, PhD'89, of Eli Lilly and Co., also a former student, reminisced about "Adam Allerhand: Teacher and Scientific Mentor." Following the symposium, a reception was held in the University Club. A number of Allerhand's former students were in attendance.



Adam Allerhand

# FACULTY PROFILE: Victor Viola *a man on the move*

The first time you meet Vic Viola you get the sense that he is a person "on the move." I don't know if this results from his many years as a runner and avid skier, or from his first love, basketball, which he played in high school; but Vic is usually in motion and inevitably in the right direction.

Starting as an English major, Vic quickly discovered his aptitude for science, and, not wanting to be a starving writer, he switched to chemistry. His first geographic move was from the plains of Abilene, Kan., to Lawrence, Kan., where he finished his AB in



Vic in family mode with wife Nancy and Romualdo de Souza's daughter, Zarya

chemistry. From Kansas he moved to the rather different world of Berkelev. Calif. There, under the occasional guidance of Glenn T. Seaborg, he matured scientifically. No doubt the independence Seaborg permitted Vic helped shape his subsequent approach to mentoring. Realizing where the action was and that he had to follow it. he subsequently went to CERN, the premier particle accelerator facility located in Geneva. Switzerland, for a postdoctoral period. Shortly thereafter, he began a faculty appointment at the University of Maryland-College Park, where the K140 cyclotron made possible proton induced nuclear reactions.

Vic's love affair with nuclear reactions of importance in nucleosynthesis stems from this period. Along a different direction, he rather quickly established himself scientifically with his systematics on the total kinetic energy release in nuclear fission, known worldwide simply as the "Viola systematics." When the advent of new accelerators in the mid-1970s made possible investigating the dynamics of colliding two heavy nuclei (the SuperHILAC at Berkeley), Vic was there at the forefront again. While on sabbatical at Berkeley, he carried out some of the first experiments on a new type of nuclear reaction — strongly damped collisions.

Always one to realize opportunity knocking, Vic availed himself of the powerful K200 cyclotron being built at IU in the late 1970s, arriving in Bloomington in 1980. His group quickly established IU as one of the premier centers for nuclear reaction studies in the world. Wherever I go, colleagues, especially those I don't know, upon hearing that I am from Indiana, ask me, "And how is Viola?" Nuclear chemistry at IU and Vic Viola are synonymous. His success was apparent locally as well, for in 1990 Vic was promoted to the elite rank of Distinguished Professor.

More recently, in the 1990s when the rest of the community (myself included) was busily pursuing the creation of the hottest nuclear systems by colliding two heavy nuclei, Vic and his group bucked conventional wisdom and chose a new direction — heating a nucleus with high-energy protons and pions. First, they built a complex  $4\Pi$  detector called the Indiana Silicon Sphere (ISiS for short), capable of measuring charged particles and — in particular — clusters with unprecedented resolution and extremely low detection thresholds. This ambitious project stretched the capabilities of the local technical shops and in many cases took them to a new level of operation (and frustration). Then, in a series of careful experiments, Vic and his collaborators systematically showed that high energy protons and pions are not only an effective means of heating a nucleus but are perhaps the best means of heating a nucleus. Recently, their data on whether nuclei can undergo a liquid-gas phase transition has received quite a bit of attention.

One of the most remarkable things about Vic is his talent for mentoring. Simply put, Vic is a superb! Many undergraduates, graduate students, postdocs, and at least one junior faculty member have benefited from the wisdom of his gentle touch. I have personally watched many students mature and develop into good scientists under his guidance — and have felt the same frustration they did of not having a question answered directly! Invariably, after a conversation with Vic I have to reflect on what his "answer" was. His selection as recipient of the 2000 Tracy M. Sonneborn Award was a tribute to Vic's teaching abilities, both at the undergraduate and graduate levels.

I recently asked Vic to share his thoughts on coming to IU in 1980 as a senior faculty member. What in particular brought him here to Indiana? What were his proudest accomplishments? Here in his own words are his reflections on the past two decades and the road ahead.

- Romualdo de Souza

# Reflections on a mid-career move

#### by Victor Viola

In the summer of 1979, I had just finished an exploratory visit to IU and was really impressed with what I found. But Nancy and I were greatly concerned about how our kids would react to leaving Maryland and their friends. We had raised them to be independent thinkers, and now that they were teenagers, we were facing the realities of dealing with that highly successful effort. Then one day I came home from my office to learn that neighbors had taken our three children to see a sneak preview of a PG-rated movie. Neither Nancy nor I had screened the movie and we were worried about its content. But as it turned out, the movie was *Breaking Away*. After that, the resistance to moving was negated. So after fulfilling my obligations to Maryland, we moved to Bloomington in 1980.

Many factors motivated my mid-career transition from Maryland to IU. Before moving one's family, pulling up stakes on a highly productive research program, and leaving a group of cooperative colleagues whom you enjoy, the reasons had to be pretty well researched. When the rankings were consulted, IU appeared on everyone's list of top 10 public universities. On the down side, Indiana's support of higher education was about as bad as



Vic in scientific mode with students, circa 19??

Maryland's. The positive spin I put on this disconnect was that the IU administration had to be doing something right to maintain such a high level of excellence in the context of the state's financial support. I later came to appreciate this success as a consequence of Herman B Wells's legacy of bottom-up management style, which focused those limited resources directly into the most successful departments and programs. This was the opposite of what had been happening at Maryland, where a top-down approach was diverting funds into administrative initiatives and attempts to patch up weaker departments.

At IU I found a dynamic, highly regarded chemistry faculty with a superb departmental support structure. The IU Cyclotron was just coming into its own as one of the world's premier nuclear particle accelerators, ideally suited for my research interests in hot nuclear matter and nuclear astrophysics. And finally, for someone who grew up in Abilene, Kan., and still insisted on riding his bike to work, Bloomington had it all over the Washington, D.C., suburbs (although I still miss the blue-shell crabs on the Eastern Shore).

My first two visits were highly stimulating and reinforcing. Adam Allerhand was clearly an energetic department chair who was committed to excellence. No BS from Adam, just direct and honest answers. I should have negotiated harder for startup funds, but with Adam I had confidence that if my program needed help, he would see that it materialized. Other interactions were also memorable. Jay Kochi put me through one of the toughest grillings since my prelims at Berkeley. Where's the connection between nuclear and chemistry? It turned out to be one of the most

> stimulating discussions I've ever had in justifying my existence in a chemistry department. Charlie Parmenter and George Ewing convinced me that physical chemistry at IU was an energetic, broad-based effort in which I could be very comfortable although George, like Jay, had this aggravating habit of forcing you to think about what you were doing and why you were doing it. Malcolm Chisholm and Gary Hieftje certainly made me feel welcome. Malcolm's reasons may have been somewhat selfserving, figuring another runner in the department might relieve him the pressure of running in the annual cross-country race.

> Perhaps the clinching interactions were with Russ Bonham. Our discussions ranged from the channelplate fast timing detectors we had developed at Maryland, to his (e,2e) scattering experiments, to departmental support services, to IU athletics. A tour of his equipment convinced me that the department possessed a superb machine shop — a critical resource, since you cannot buy the instruments needed to stay at the forefront of nuclear chemistry. Russ also shared my love of running (except that he was really good) and, since his father had been a basketball coach, was highly knowledgeable in my other athletic interest, basketball (Charlie Parmenter would replace interest with "fanaticism"). I knew that IU had the best basketball coach in the country (a conclusion I had reached while he was still at Army), but I had been unaware that Sam Bell, another Hall of Famer, was the track coach. So IU had everything.

> One thing that I quickly learned to appreciate shortly after I arrived was the meaning of high standards in the department. In my first tenure meeting, there was a case that would have been a shoo-in at Maryland, (continued on page 10)

# FACULTY PROFILE

#### (continued from page 9)

but was hotly debated and eventually turned down. In time I learned to appreciate that excellence and high standards cannot be decoupled. Probably the most difficult challenge of academic life is balancing the personal impact of a negative tenure decision against the need to meet demanding standards that are frequently a moving target. Sometimes I worry that I am too concerned about the imposition of high standards, but if we don't do it in academia, it's unlikely that other segments of society will take up the slack.

There have been many positive changes in the department during my 22-plus years. From a strictly personal point of view, I'm very proud of the nuclear chemistry program that has evolved. My former colleague Kris Kwiatkowski was instrumental in establishing our research program and bringing it to a high level of international visibility. Romualdo de Souza has brought youth and new ideas to the nuclear chemistry program and is currently leading it in the direction of research with beams of unstable nuclei, geared toward the accelerator of the next decade, a \$900 million facility that will be located in the Midwest. In the education area we have introduced nuclear phenomena to large numbers of undergraduate students, hopefully helping to overcome some of the irrationality about the relative risks of things nuclear that pervades our society. And of course we're proud of our nuclear chemistry graduate students and postdocs, who have gone on to numerous faculty positions and jobs in both the private and public sector.

Departmental facilities have also improved greatly. The new lecture hall and adjoining demo room provide a much more effective environment for teaching large classes. The small classrooms have also aided seminars and smaller courses — a much better environment than in Ballantine or more distant outposts. The Instructional Support Office has expanded its services to students and moved us into the computer age. Everything you need to know about a course is up on the Web.

Now if we could only get the students to visit that part of the Web. The only downside of the computerization is the heavy reliance on multiple-choice exams, which is one more indication of the degree to which I've become geriatricly challenged. I still think handwritten problems are an essential teaching tool.

But the one constant and core strength of our teaching program, Dennis Peters, remains. Reading your audience is the key to successful teaching, and no one is better than Dennis in that respect.

In a somewhat different sense, I too have left my mark on the teaching of chemistry at IU. A former student (now an MD) reminded me of this when I encountered her at the IU hospital a few years ago. She recalled a demonstration that left a vivid impression with her — the only thing she remembered about the course, she said. In demonstrating the activity of metals, I had shaved off a small piece of K metal from a rod about 3 centimeters long and was holding each piece with forceps in each hand. Then, as I rattled away, I absentmindedly put the large piece in a water bath, setting off a spectacular fireworks display. We had tiny pieces of K flying every which way, those in the air igniting, and those that landed on the desk top leaving my mark on the lecture counter top. Those marks are still there today (in case some of my colleagues wondered where they came from).

There are many good demos we cannot use anymore. Like the LN2 demo where you stuff the thumb of a rubber glove with hamburger, put on the glove with the thumb folded under and then stick the thumb in the LN2. After a short time, you pull out the thumb and whack it with a hammer to demonstrate brittleness at low temperatures. Unfortunately, this had to be curtailed (before I arrived at IU) because the hamburger landed in a girl's lap one day and she passed out, requiring emergency personnel.

The 1980s addition and renovation of the 1960s wing, driven by Adam, Jack Shiner, and Paul Grieco, have enabled us to keep pace with the field, although new space is clearly needed to accommodate today's new research demands. In addition, the renovation permitted Jim Reilly, Russ Bonham, Ed Bair, and me to move from our isolation in Wylie Hall to modern digs in the department.

But beyond physical facilites, the continued dedication of the Department of Chemistry staff stands out. Nothing demonstrated their efficiency and effectiveness more than our Indiana Silicon Sphere, a \$750,000 nuclear particle detector project that began in 1990 and took three years to complete. At the time ISiS was arguably the most sophisticated piece of equipment ever constructed on this campus, other than the IUCF accelerators. John Dorsett's contributions to the mechanical design were fundamental, and the machining of Kenny Bastin, Larry Sexton, and their coworkers in the mechanical instrument shop was superb. The project helped bring us into the area of computer-assisted machining. Andy Alexander and John Poehlman helped design and construct the electronics modules required to process the signals from hundreds of data channels. All of this effort required the purchase of thousands of components from nearly a hundred different vendors, which Amy Van Pelt and her co-workers handled with remarkable efficiency. Jim Allen should also be given credit for his management of the business end of the department, including his role in the construction of new facilities.

Since my research is interdisciplinary (I've advised PhDs in chemistry, physics, and astronomy), it's worth making some remarks about my interactions outside the department. "Interdisciplinary" is an academic buzz word that has been around as long as I can remember. Too frequently the word is associated with some specialized area of research that is fashionable at the moment. Success in such efforts requires a commitment to two separate programs, with the overhead of duplicate faculty meetings, committee assignments, and seminars. This time demand is more than counterbalanced, however, by the richness of intellectual breadth that is associated with constant exposure to more than one discipline. Chemists and physicists approach problems differently, and by assimilating the best from both (one hopes), science will be the beneficiary. As have been my colleagues in chemistry, those in physics have been equally supportive, especially Bob Pollack, Steve Vigdor, and Tim Londergan.

To sum it all up, Indiana University has been very good for me. I've been able to pursue a uniquely rewarding research program, work with challenging students and interact with an exceptional group of colleagues, both faculty and staff, only a few of whom I've been able to mention here. But I am deeply indebted to all for their friendship support, and often, patience.

Last summer Vic underwent hip replacement surgery. In typical fashion, within six weeks he was off to participate in the ACS meeting at Boston. Back in Bloomington, runners at the IU track, upon hearing that Viola's legs were the same length for the first time in years, were heard to remark, "Boy, are we in trouble now! Viola's bionic."

— Romualdo de Souza



**P. Andrew Evans** received the 2002 Pfizer Award for Creativity in Organic Chemistry, an honor given to synthetic organic chemists who have distinguished themselves through creative contributions to organic chemistry and through excellence in training graduate students.

Ken Caulton spent some of the summer of 2002 in Russia solidifying plans for a student visit to his lab. He was outside examiner on a PhD exam in Canada, and he also served on a panel selecting awardees in the NSF CAREER competition for young chemistry faculty. During the summer of 2002, a NSF-sponsored undergraduate worked in Ken's lab with IU graduate student Lori Watson on a project designed to show a new bonding mode of olefins to inexpensive iron complexes rather than those containing the more expensive platinum-group metals.

Let the good times roll! In addition to other accomplishments, the discovery of RNA cold

denaturation led to the recognition of **Andrew Feig** as a 2002 Cottrell Scholar of the Research Corporation, an award that recognizes advances in both teaching, research, and the promise to develop as a national leader in both fields.

**Gary Hieftje** presented plenary lectures at the International Conference on Atomic Spectroscopy in Tokyo, the Glow Discharge Network Meeting in Austria, the Analytica Meeting in Münich, the 40th Anniversary of the Working Group in Spectrometry in the Netherlands, and the Regional Nordic Conference on Plasma Spectrochemistry. He also gave invited lectures at the National ACS Meeting in Chicago, a meeting of the Federation of Analytical Chemistry and Spectroscopy Societies in Detroit, and the Merck Company in Germany.

**Ron Hites** delivered talks at the Department of Chemistry, University of Texas-El Paso in February; at the Department of Environmental Science and Engineering, Rutgers University in March; at the Great Lakes National Program Office of the US Environmental Protection Agency in Chicago in May; at the Great Lakes (continued on page 13)

### Ernest Davidson's reflections upon retirement

The Woodburn House was the site on May 22 of a reception for Ernest and Reba Davidson in appreciation of Ernest's 18 years as a Department of Chemistry faculty member, the last two as chair of the department. Among the more than 50 guests were Kelly Blackwell, his former secretary and assistant; Kumble R. Subbaswamy, dean of the College of Arts and Sciences; and Sharon Brehm, IUB chancellor. Charlie Parmenter had arranged an informal program. In a farewell note to IU• Chemistry, Ernest made the following observations.

My last year was crowned with what is probably the final recognition of the research my group has done over the last 40 years. Last July, an international scientific meeting was held in Seattle with more than 300 scientists in attendance in celebration of my 65th birthday. The meeting was named "The Right Answer for the Right Reason" after a goal I coined at a meeting several years ago. In June of this year, I received one of the National Medal of Science medals from President George Bush. More information about this with pictures — is available on the web at www.nationalmedals.org. This medal was presented in the White House. My wife, two of my sons and their wives, and my granddaughter were all in attendance. The medal recognized my work in developing computational quantum chemistry into a useful tool for chemists. This summer I received the 2001 Schrödinger Medal from the World Association of Theoretically Oriented Chemists during an international conference in Lugano, Switzerland. This lake is near the one where Schrödinger first conceived of his famous equation in 1925. In October, I made a lecture tour of England as the Boys-Rahman Lecturer sponsored by the Royal Society of Chemistry. On the way home, I stopped at Indiana University to receive the College of Arts and Sciences Alumni Award for 2002.

Equally important to me is that I have been able redirect my theoretical research during the last two years to a new project. My research group consists, informally, of Aurora Clark (a joint student with Zaleski), Kris Quinlan (an inorganic student left behind by Malcolm Chisholm), and Cristina Canada-Vilalta (an inorganic student left behind by George Christou). These students have caused me to become more involved with the theory of inorganic reactions mechanisms and molecular magnets. We have developed a new theoretical approach to defining the spin on atomic centers in a molecule that holds great promise as a tool for analyzing wave functions. This has led to belated collaboration with George Christou, now that we both have left Indiana.

(continued on page 12)



The November 2002 issue of *Popular Science* magazine lists the nation's "Brilliant 10" young scientists. No. 2 on the list is our department chair, Professor David **Clemmer**. All on the list are under 45 years of age. The nominees were selected after talking to " ... university department heads, academic think tanks, and the bestowers of awards."

Clemmer characteristically credits his colleagues and graduate students as well as machine and electronics shop personnel, the computer technical group, and his predecessors in the department and the field. He considers it an honor for the department rather than for himself.

The unprecedented technique that he and his students have developed, combining a unique ion mobility separation of large molecules with mass spectrometry, has provided insight into gas phase protein conformations not heretofore available.

•...•

— The Editors

#### Davidson

(continued from page 11)

"My association with Indiana University is now coming to an end. Officially, I am an emeritus professor at Indiana, but in my own mind, I am not retiring but simply moving to other positions. I now have an appointment as professor at the University of Washington and will soon have a similar position at the University of North Carolina. I have a home in each of those locations and no longer have any connection to Bloomington. My legal residence is now in Edmonds, Wash., where I can watch the ferries on Puget Sound. I am still an editor of the Journal of Chemical Physics. The editorial office (and my secretary) has now moved with me to Seattle. I plan to hire a postdoc and continue research in both locations. For the rest of this year, I will still have one graduate student finishing at Indiana, so I will need to drop in occasionally.

This completes a connection with Indiana that began in 1958 when I started graduate school as a student with Professor Harrison Shull. My undergraduate chemical engineering degree from Rose-Hulman was heavy on mathematics and physical chemistry, but light on descriptive chemistry, so I was very well equipped to go into theory. My PhD research consisted of a 'massive' calculation on an excited state of the H<sub>2</sub> molecule requiring over 5000 hours of computing. While trivial by today's standards, this calculation showed novel effects such as bond length isomerization and Rydberg-valence mixing. I went from IU to a post-doc position in 1961 with Professor Joseph Hirshfelder at Wisconsin. Quantum chemistry at that time was a very small community. A quiet word from Harrison Shull to

William Simpson got me a job at the University of Washington in Seattle in 1962. A job offer from Hirshfelder at Wisconsin in 1965 got me early promotion and tenure. Seattle was a beautiful place to work and to raise my family. After 22 years, and with all my children out of the nest. I returned to Indiana in 1984 as a Professor. Two years later Indiana decided I was distinguished enough to be promoted to Distinguished Professor. While at Indiana, I was elected to the National Academy of Sciences and the American Academy of Arts and Sciences. Finally, after 18 years, I am returning to Seattle. This seems only fair, since much of the work that has brought recognition to me and to Indiana was initiated in Seattle.

During all these years I have remained focused on developing methods for computation of properties of molecules by solving the Schrödinger equation. Along the way, I have developed methods for systematically computing integrals and for finding the eigenvalues of very large matrices. I have also collaborated with more than 50 senior scientists on applications to organic, inorganic, physical, analytical, and biological chemistry as well as applied mathematics and physics. This has resulted in more than 400 publications. The great fun of doing theory is that the fundamental ideas and methods cut across all of chemistry. I have also done more than my share of journal editing. I have been a working editor of the Journal of the American Chemical Society, the Journal of Chemical Physics, Chemical Physics Letters. the Journal of Computational Physics. and Theoretica Chimica Acta. And, oh yes, I have taught general chemistry to more than 20,000 students."



Ernest and Reba Davidson with Kelly Blackwell

'The great fun of doing theory is that the fundamental ideas and methods cut across all of chemistry.' — ERNEST DAVIDSON

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# AROUND IU CHEMISTRY

#### Faculty news

#### (continued from page 11)

regional Meeting of the ACS in Minneapolis (a Plenary Lecture) in June; and at the Gordon Research Conference on Environmental Sciences in Holderness, New Hampshire in June. He was also named by the Institute for Scientific Information as one of the world's most cited and influential authors.

**Glenn Martyna** and **Shuming Nie** have left the department.

A new organometallic chemist, **Daniel Mindiola**, joined the department in July and received the 2002 Camille and Henry Dreyfus New Faculty Award. Previously, he was a postdoctoral associate in the Department of Chemistry at the University of Chicago with **Greg Hillhouse**, who received his PhD from Indiana University in 1980 while working with former faculty member **Barry Haymore**.

**Dennis Peters** marked his 65th birthday, an event celebrated by a surprise party and mini-symposium given by his former students.

Krishnan Ragavachari, a theoretical chemist who previously was a Distinguished Member of the Technical Staff at Agere Systems/Lucent Technologies (Bell Laboratories), joined our department in August with the rank of Professor. Recently, he was elected a Fellow of the American Physical Society, Chemical Physics Division. His invited lectures include those given at Iowa State University, University of Illinois at Chicago, University of Delaware, Smith College, as well as those presented at symposia on "Connecting to the Nano World" and "Current Trends in Computational Chemistry, at a workshop on "Semiconductor Surface Chemistry," at the American Conference on Theoretical Chemistry, and at national meeting of the American Chemical Society at Orlando.

Vic Viola reports that the Indiana Silicon Sphere collaboration continued to strengthen its case for a nuclear liquid-gas phase transition and for critical phenomena in hot nuclear matter, results that are not only relevant for understanding nuclear behavior but also for theories of neutron star formation during Type II Supernovae explosions. In a series of papers published last winter and in several talks, the authors reported that all experimental findings are consistent with a statistical, boiling-like phenomenon. Further, the size distributions of the clusters in the vapor phase conform to the scaling laws predicted by general theories for liquid-gas behavior over ten orders of magnitude. Vic also served on the Department of Energy's Low-Energy Physics panel that reviewed all of the US and several leading international

laboratories as part of a planning exercise for the field's accelerator of the future, a \$900M Rare Isotope Accelerator for radioactive beams. The accelerator will be located in the Midwest.

The book *Caught With My Pants Down* by **Rupert Wentworth** appeared recently. Although the title and content of this book describe the numerous surprises the author experienced with metastatic prostate cancer, the title is also literally true because it describes his situation when he was diagnosed.

# Happy 60th, Milos!

A belated celebration of the 60th birthday of **Milos Novotny** occurred in the Indiana Memorial Union on June 15, 2002. Turning 60 did not slow his activity and creativity, however. In addition to his initiative, work, and leadership with proteomics within the department and the university, a topic explored elsewhere in this issue of *IU-Chemistry*, he organized a minisymposium honoring **Adam Allerhand** and delivered lectures in the United States, South America, and Europe.



Gary Wiggins, head of the Chemistry Library and director of the School of Informatics Programs in Bio and Chemical Informatics, received a Distinguished Alumni Award from the School of Library and Information Science. He also continues to serve on the American Chemical Society Publications Division Library Advisory Group. He accepted an invitation to be on the new Chemical Abstracts Service Academic Advisory Committee. He was also elected to serve on the Bloomington Faculty Council as an atlarge representative; he was chosen as the Secretary of the Bloomington Library Faculty Council; and he began a one-year term as the President of the Indiana University Librarians Association. He is finishing his second and final term as Coordinator of the Science Libraries at IUB. At the Boston ACS national meeting, he cotaught a workshop entitled "Teaching Chemical Information," which drew 26 participants to the CINF-sponsored session.

**David Williams** presented lectures at Boston University, Ball State, University of Missouri at Columbia, Cambridge University, Oxford University, and the University of Nottingham, as well as several industrial and research institutions.

- Rupert Wentworth

## "Look, Mom no cavities!"

This advertising slogan from the late 1950s for Proctor & Gamble's Crest toothpaste is a fitting testimonial to groundbreaking work that made both the toothpaste and that slogan possible, work that was accomplished by Indiana University's Harry Day, William Nebergall, and Joseph Muhler. Many of those who have a degree in chemistry from IU know that this trio is somehow connected to Crest, but how many are familiar with the details of that connection? Professor Day told most of the story in the fall 2001 issue of Chemical Heritage, and some of his tale is summarized here.

# Harry Day and Crest

n the early 1900s, a Colorado dentist, who was searching for the cause of "mottled enamel," a dental condition aptly described by this name and its other name, "Colorado brown stain," noticed that teeth with this condition were resistant to decay. The dentist sent samples to a chemist who determined that the cause was excess fluorides coming from some drinking water in Colorado. Later - just about the time (1940) that Harry Day began his long career at Indiana University - Joseph Volker, who was subsequently the president of the University of Alabama, showed that isolated tooth enamel was more resistant to acid if it had been treated with sodium fluoride. This observation was the basis for his hypothesis that fluoride would inhibit tooth decay by making the outer layer of the teeth less reactive to the acid coming from bacteria-induced fermentation of sugars.

When Harry Day arrived at IU, he began teaching a course for freshman dental students in which he emphasized the importance of biochemistry and sound nutrition on oral health. In the laboratory component of that course, Joseph Muhler and another student began working on a recently published method for measuring the fluoride content of teeth, bones, and other parts

of the body. Muhler moved to the medical school in Indianapolis the following year, a normal move at that time for dental students, but his interest in fluorides did not wane. With chemicals and apparatus he obtained from Day, he began to examine and enlarge on Volker's hypothesis by studying the effect of acid on isolated tooth enamel that had been exposed to various fluoride compounds. Muhler reported some time later that stannous fluoride seemed remarkably more effective than sodium fluoride and other fluorides in protecting teeth from acid.

After Muhler received his dental degree in 1948, he decided to take a PhD in chemistry

under the direction of Harry Day. In less than a year, they provided strong evidence that stannous fluoride is more effective than sodium fluoride and other fluorides in preventing dental caries in rats. The success with laboratory rats led them to study the effect of dentifrices containing stannous fluoride with humans. Muhler focused on aspects related to dentistry, and Day contributed to the coordination and administration of the program, while a new faculty colleague, William Nebergall, tended to the inorganic aspects of the project, such as the production of high purity stannous fluoride and an abrasive that was compatible with this substance. At nearly the same time, Day reached an agreement with Proctor & Gamble Co.: They would provide funding and substantial research in certain areas (e.g. the binder for the paste). Marketable findings would bring health benefits to the public, profit for P&G, and royalties to the principal beneficiary, the IU Research Foundation, as well as Muhler, Nebergall, and Day.

In 1951, this team initiated a study of 1,200 children in the Bloomington public schools, with the full cooperation of the Division of Dental Health of the state of Indiana, the university administration, and local school officials. One group of the children received topical applications of stannous fluoride, a second group took sodium fluoride, while a third group received only water. The result after one year was clear: The children with stannous fluoride had experienced far more protection than those treated with sodium fluoride.

After other tests and after seeking and obtaining approval from the Food and Drug Administration, P&G began to market the new toothpaste, calling it Crest. They had the largest increase in sales that they had ever experienced. Since then, Crest has been modified several times, now being formulated with sodium fluoride. (Two readers of Harry Day's article asked in the winter 2001-02 issue of Chemical Heritage why the Crest we can buy today contains sodium fluoride rather than stannous fluoride. The editors replied that some of the original ineffectiveness of sodium fluoride was due to its incompatibility with dicalcium phosphate, the abrasive that was in use during the early tests. Once silica abrasives were developed, compatibility was no longer an issue, and the cheaper sodium fluoride began to be used. Stannous fluoride is still used, however, in toothpastes that incorporate special abrasives.)

Lucy Williams, a woman with a dazzling smile, the daughter of chemistry Professor Lynne Merritt, and one of the school children who was tested, recently described her experience to me: "The stuff they gave me had a really nasty taste." Nasty or not, the team had made a tremendous discovery, a discovery that would benefit millions of people. Modestly, Harry Day gives most of the credit to Muhler and Nebergall.



Harry G. Day



#### Annual awards honor staff

The Department of Chemistry celebrated its annual staff appreciation cocktail reception and dinner on May 1. Jim Allen received the Outstanding Staff Award and was recognized for his many contributions over the years. Several former chairs spoke of the expertise he provided them during his 22 years in the capacity of director of chemistry business. Additionally, we honored seven staff for their IU anniversaries: 10 years -Lee Ann Mobley (research secretary for Professor Hieftje); 15 years — Andy Alexander (senior electronics engineer in our electronics instrument service); 20 years — Sarah Collins (accounting associate in our business office); 25 years -Robin Nordstrom (duplicating operator and media technician in our information technology group) and Larry Mobley (storeroom assistant in our scientific storeroom); and 30 years - John Cramer (research technician in our mechanical instrument service) and Bob Addleman (major instrument systems engineer). We were also very pleased to have some of our retirees join in the festivities — Loyd Hudson, Carol Lettelleir, Kathryn Shirley-Koehl, and Kirsten Streib.

#### Farewell to those leaving

This past year, we had to say our farewells to many long-term and dedicated staff. **Sondra** (**Flynn**) **Gearner** made the big move to Gainesville, Fla., to catch up with **George Christou** and "the group." Sondra had given us 16 years of excellent support working primarily with the inorganic chemists. She received the Chemistry Outstanding Staff Award in 1992. She had been the research secretary for professors Caulton, Jabri, Reck, and Zaleski when she left in December. Sondra is happy with her relocation and is enjoying life in Gainesville — which was very evident when she visited us in May! We miss her smiling face and great attitude, but know it is appreciated in Gainesville.



Jim Allen retired in July after 22 years as the director of chemistry business. As mentioned above, Jim received the Chemistry Outstanding Staff Award this year. We appreciate the tremendous assistance Jim provided the department and his many contributions to the

Jim Allen

university in the area of financial management. We wish both he and his wife, Ann, a wonderful retirement.

**Ken Dehart** left in July to join the staff of the IU Department of Geological Sciences as their

computer systems manager. Ken had worked in the Department of Chemistry for 23 years at two different times, leaving for a four-year period to return to school. He has been a computer specialist in different areas over the years, initially working in our research computing group, and most recently was our UNIX administrator in our information technology group. We appreciate all the many years Ken has given us and wish him the best as he assumes this new position in the Indiana Geological Survey.

**Toni Maddox** continues her editorial duties for the *Journal of Chemical Physics* for **Ernest Davidson**, but she's doing it in Seattle! Toni assumed her position as editorial specialist for the journal in fall 1999 and had also been Davidson's research secretary. Davidson has retired and relocated to Seattle, and offered Toni the opportunity to continue her responsibilities at the University of Washington. Toni decided to join him, and she moved the journal office to Seattle in mid-August. We will miss Toni's contributions to the department also, which include her

(continued on page 17)



#### CHEMICAL INFORMATICS

The search for a chemical informatics faculty member for the Bloomington campus continues this fall. The School of Informatics itself moved into renovated quarters in October. The building is the old Alpha Omicron Pi house on the northeast side of the intersection of 10th and Woodlawn streets.

Three graduate students entered the chemical informatics program this year. They are **Jason Gretencord**, **Leah Sandvoss**, and **Kenrick Vidale**. Vidale is the first recipient of the \$15,000 Daylight Chemical Information Systems Fellowship. Wendie Shreve plans to complete her master of library science chemical information specialist program in May 2003.

- Gary Wiggins



Nine new public computers were added to the Chemistry Library last winter, and all have been loaded with the latest version of appropriate software. This includes Spartan '02 Essential Edition, which was obtained in a joint purchase with the Department of Chemistry.

Many bound journal volumes were shifted to storage in anticipation of the opening of the IUB Libraries new Auxiliary Library Facility (ALF) in October, and a large number of older books and review serials have been earmarked for later transfer to the ALF. The ALF will hold up to 2.7 million volumes and contains a state-of-the-art preservation facility.

Electronic backfiles of all of the ACS journals are now available, as are the organic and inorganic collections of Elsevier Science journals. There are very few current chemistry journals for which we do not have an electronic subscription now. In fact, the faculty approved the cancellation of a number of the print versions of journals this year (all 24 of which were Elsevier Science titles). From 2003, we will use only the electronic versions of those titles.

- Gary Wiggins

### STAFF PROFILE:

# Ray Sporleder

The elusive Ray Sporleder has been brought to ground! An almost ephemeral presence over the years, Ray has maintained a profile that belies his many remarkable contributions to faculty and student research projects. In retrospect, several of these might have failed without his insight that allowed vexing problems to be overcome. In the following profile, Professor Jim Reilly has captured the essence of this unusual personality.

— The Editors



Ray Sporleder, circa 1970

# An interview with an iconclast

**W** ou get the feeling that interviewing him is a bit like trying to fish with your bare hands. Just when you think you've captured the essence of Ray Sporleder he's gone. An inscrutable iconoclast, Ray would rather talk about the remarkable computer-interfaced instrumentation projects he is currently working on than about anything he's done in the past. But given the chance, he would rather describe 30 years of research work in the Department of Chemistry than talk about himself. Nevertheless, after a couple of hours, it is possible to pick up a few tidbits.

Ray grew up in southern Indiana, in a small town called North Vernon, where as he says "even the poor folks owned their home." He feels fortunate that in the eighth grade his family moved to Lima, Ohio, where there were far more high school students and better educational facilities. Ray's favorite high school subjects were physics and math. His enigmatic nature surfaced by the end of his junior year, when he discovered that he had completed every high school course that he really cared about. His guidance counselor

> recommended a set of easy classes in which to while away an enjoyable senior year. Instead, Ray chose not to "waste a year" and joined the Navy at age 17. (Subsequently he took the GED and scored 98 percent in science/ math to obtain his high school diploma). While some people might remember the hard work and discipline associated with being a part of the military, Ray primarily talks about the educational opportunities it provided. "The schools and the experience were invaluable preparation for my career in science." Ray laughs at his naiveté at that age. The Navy's occupational testing pointed him toward a career as a fire control technician. He was surprised to learn that that didn't mean putting out fires; in fact, it involved the weapons systems that delivered shells,

torpedoes, and missiles to targets. Most significantly, in retrospect, the work involved electronics and computers. To learn these subjects Ray spent more than two years in Navy schools, during which time he loved the focus and the lack of "distractions" associated with general education. Success at this work led to other opportunities in the Navy that attracted him. By extending his enlistment and being in the upper 10 percent with his class grades, Ray was accepted for nuclear submarine service. Over the next few years, he participated in eight patrols, each of which was three months in duration. He qualified on two classes of "nucs."

"Submarine qualification was the most rigorous and best school I have ever had. It included inertial navigation, nuclear reactor plant control, propulsion and SSTG electrical system, R11 and lithium bromide absorption systems, and, of course, my specialty, missile fire control system, including the Navy's first digital computers, the CDC 172s." Being under water for nearly three months straight is not for everyone, but Ray's euphemistic spin on the experience is that "the food was great, our shipboard library adequate, and it was a great place to study." You might think that the underwater isolation was the primary reason for his eventually leaving the Navy. Instead, it was educational. During his submarine years Ray was able to attend Navy schools for much of his shore time, on the order of four months per year. Unfortunately for the Navy, they eventually ran out of subjects that he wanted to study! So after a seven-year Navy career Ray packed up and came back to Indiana. He enrolled at IU, introduced computer technology in anatomy and physiology research efforts and studied primarily math and physics. True to form, Ray refused to take foreign language courses required to satisfy university distribution requirements, and he never completed his physics BS degree, although he repeatedly made the Dean's List. Fortunately, his talents in the computer area were starting to be appreciated, and Professor Jack Shiner hired him to work on interfacing the department's MS9 mass spectrometer in 1970. Ray doesn't recall his actual job title, "I think it was administrative assistant or something like that Miss Dickey's position." Eventually it turned into a computer systems engineer appointment, and he has been heading our research computer systems group for more than 30 years.

Despite the transition from Navy to the university, Ray's interest in learning never missed a beat. He attended a Xerox Data System school in California in the early 1970s and a Digital Signal Processor School in Houston in 2000, with a few dozen others in between. Ray feels a need to "keep up with the latest technology" and has found that he can apply many of the new technologies introduced in these schools. Ray and the computer systems group have contributed to most research groups in the department. His largest projects have been with the Bonham and Clemmer groups. He views Russ Bonham as his "premier mentor" during his career at IU. Another facuty mentor, Marvin Carmack, "exemplifies the benevolent gentleman I work to become."

"I love working with graduate students; they have been my best teachers at IU," Ray says. It's evident that the students who have benefited from his expertise, long hours, and hard work feel equally appreciative of Ray.

In the 1970s, Ray was able to take advantage of his technical expertise by starting his own company, Systems Technology. During his weekends and "vacation" days, he has worked with other companies on computercontrolled manufacturing and data processing, particularly associated with factory automation in Mexico and writing an accounts receivable system for a billion-dollar Ohio corporation. His entrepreneurial success has been a nice complement to his IU career.

Although Ray feels "I have always seemed to be lucky ...," his life has not been without tragedy. He lost two sons, each at the age of 20, one due to cancer and the other in an automobile accident. On a happier note, he has a daughter, Diana, who lives in California and is employed as an accountant at AMD, and a 12-year-old granddaughter, Andria.

Ray's fondness for his work is evident to everyone he collaborates with. "Research is like playing chess," he says. He enjoys the fact that he has been able to contribute to both esoteric, fundamental research projects and, particularly more recently, to practical, biomedically related research. For him, either way, "It's fun."

Ray's enthusiasm for research is infectious, and members of the Department of Chemistry can look forward to many more years of working with him. His vision of the future includes smart instrumentation and facilitating connections between research groups. Whatever he does, Ray



likes challenges and actually enjoys operating under pressure. In his mind, "there are three types of jobs worth doing: those that cannot be done, those that you do not have the resources to do, and those that there isn't enough time to do." We hope members of the department will come up with a series of impossible projects that will keep Ray entertained for the next decade! Graduate student Sunnie Myung with Ray today

- Jim Reilly

# AROUND IU CHEMISTRY

#### Staff news

(continued from page 15)

assistance in the development and maintenance of the departmental Web calendar.

Heather Drake left our graduate office as our graduate admissions coordinator in August, and she and her husband, Peter, headed to Portland, Ore. In Heather's five years she had done an outstanding job, and in 2001, she too had received the Chemistry Outstanding Staff Award. Her husband completed his PhD in computer science and started a faculty position this fall at Lewis and Clark College. We extend gracious thanks for all Heather's contributions to our graduate program and wish them the best in their new lives, back in the Northwest.

And finally, we say our farewells to **Pat Stapleton** upon her retirement in September. Pat had been our administrative assistant for graduate affairs for most of her 32 years in the Department of Chemistry. Pat also had done an outstanding job in her many years in our graduate office, maintaining extremely high standards and serving as a resource to many graduate advisers over the years. She received the Chemistry Outstanding Staff Award in 1980 and was also awarded the Leo F. Solt Distinguished Service Award of the Graduate School in 1998. The latter award is given annually to a member of the IU faculty or staff who has contributed significantly to the excellence of graduate education at IU. This award is a fitting tribute to Pat's dedication to the graduate program in chemistry. Pat is relocating to Centennial, Colo., to be close to her son and his family and enjoy her new rocking chair, rocking in the Rockies.

We extend the most heart-felt thanks to these very dedicated staff for their many contributions to the Department of Chemistry and their very loyal service to the department. We graciously thank them and wish them all the best in their new endeavors.

#### **Staff promotions**

**Amy Van Pelt** was promoted to director of chemistry business in July, upon the retirement of Jim Allen. Amy has done an exceptional job in her 15 years in the department. She began as our purchasing assistant in our requisitioning office and was soon promoted to the manager of our requisitioning office. She replaced Pat Burner upon her retirement in 1995 as our manager of scientific stores and requisitioning. Amy received the Chemistry Outstanding Staff Award in 1998 and became our associate director of chemistry business in 1999.

**Toni Lady** was promoted to our administrative assistant for graduate affairs, replacing Pat Stapleton. Toni had worked for the past year as the research secretary to professors Burke, Oakley, Richardson, and Stone. Previously, she had worked for four years as an assistant recorder at University Division and at the College of Arts and Sciences for 11 years maintaining student records and certifying undergraduate degrees. Toni assumed her new responsibilities on Sept. 1.



During the 2001–02 school year, Professor Josef W. Zwanziger was director of graduate studies. Serving with him on the Standards Committee were professors Kenneth G. Caulton, Gary M. Hieftje, Lawrence K. Montgomery, Martha G. Oakley, and Charles S. Parmenter.

The Graduate Admissions Committee was chaired by **P**. **Andrew Evans**. Evaluating the hundreds of dossiers submitted to the department were professors **Bogdan G**. **Dragnea**, **Andrew L. Feig**, **Gary M. Hieftje**, **Evelyn Jabri**, **Jeffrey N. Johnston**, **Dennis G. Peters**, **James P**. **Reilly**, and **Jeffrey M. Zaleski**.

#### Fellowship award winners

Four industrial fellowships and two endowed fellowships were awarded to chemistry graduate students for the academic year 2001–02.

Amita Datta was awarded the Kraft Fellowship. She received a BS degree in biochemistry from McMaster University, Hamilton, Ontario, Canada, in 1998. She started graduate school at Indiana University in 1998 under the direction of Associate Professor Martin J. Stone. Her research in the Stone group has focused on understanding the interaction of the human chemokine eotaxin with its G-protein coupled receptor CCR3. This ongoing research involves designing soluble CCR3 model systems to probe the chemokinereceptor interaction.

The Eli Lilly Fellowship in Analytical Chemistry was awarded to **Andrew W. Szumlas**. He completed his undergraduate education at Ohio University in 1998, where he received a BS degree in forensic chemistry. While at Ohio University, he was involved in undergraduate research under the guidance of Gary Small, where he developed data processing algorithms for the analysis of airborne pollutants by Fourier transform infrared spectroscopy. Szumlas started his graduate research at IU in 1998 with Distinguished Professor and Robert and Marjorie Mann Chair Gary M. Hieftje. His initial research efforts were directed towards the development of fiber-optic chemical sensors. During this time he studied the application of unique quantum dot properties to optical sensors, along with new applications of a unique distributed fiber-optic sensing method. His current research efforts lie in the field of ion mobility spectrometry (IMS), where his goal is the combination of optical detection spectroscopies with an IMS spectrometer.

**Brian J. Kraft** was the recipient of the Lubrizol Fellowship. Kraft received a BS degree in chemistry and a BA degree in biology from Central Washington University in 1998. He began his graduate studies at IU in fall 1998 under the direction of Associate Professor Jeffrey M. Zaleski. His research in the Zaleski group has focused on the characterization of photochemically generated metal-bound organic radical species in both solution and low-temperature matrices. This work utilizes various spectrochemical methods both static and time-resolved to compare the physical properties of free and metal-*(continued on page 19)* 

### **AROUND IU CHEMISTRY**

Staff news

(continued from page 17)

#### New staff additions

**Kaycia Myers** joined the department in November as research secretary for professors Clemmer and Peters. Kaycia had formerly worked as an office service assistant at IU's Office of Space Management and as an institutional transaction processor at Financial Management Services. Within FMS, she worked as a customer service contact and also assisted in the area of payroll and international tax.

**Kevin Bruce** joined the department in January in a new research lab technician position in the Novotny lab. Kevin graduated with a BS in biological sciences from the University of Notre Dame in May 2001. He spent a semester taking classes at Fundacion de Estudios Internacionales in Toledo, Spain, during his undergraduate career, where he learned extensive lab techniques and skills.

**Jennifer (Watson) Kelley** joined the department as the research secretary to professors Caulton, Jabri, Mindiola, and Zaleski, also in January, replacing Sondra Gearner. Jennifer graduated from Towson University in Maryland with a BS in psychology and had recently relocated in Bloomington to join her fiancé. They have since married and both are now graduate students at IU.

**Eric Koperda** joined the department in April as the computer systems administrator for the molecular structure center's reciprocal net distributed molecular structure library project. Eric came to us from the University of Georgia, where he served as the lead system and network administrator for the UGA School of Music. In addition to having excellent information technology skills, Eric is a semi-professional cellist. Katie Lattimer joined the department in August, replacing Heather Drake as the graduate admissions coordinator. Katie was originally from Bloomington, but has just returned to Bloomington from Urbana, Ohio, where she was working as a financial analyst for Honeywell/Grimes Aerospace Co. She has a bachelor's degree in business administration from Urbana University and has a variety of business experience.

**Tanya Kinnick** joined the department in September as research secretary to professors Burke, Oakley, Richardson, and Stone, replacing Toni Lady. Tanya just moved from Wisconsin to the Bloomington area. She brings excellent computer skills, as she spent four years as a computer systems senior operator. She also has a BS in biological sciences from the University of Wisconsin.

#### Former staff update

A quick update on some former long-term staff — **Shirley Humphrey** has followed her family back to Bloomington, having spent 18 years in Arizona, and just now is settling in the Ellettsville area. **Holly Willett** and her husband, Ron, have returned to their roots too and moved back to Ohio. Their new address is 29 Canterbury Dr., New Bremen, OH 45869 (hwillett@nktelco.net). Both were long-term employees holding key positions in the department, Shirley as payroll coordinator and Holly as our undergraduate adviser.

Last, we saw the passing of a recent retiree, **Bill Streib**, who lost his battle with cancer and died on June 28 (see tribute on page 29). Bill had worked as a crystallographer in our structure center for 37 years and for a duration also served as our director of laboratories. Both he and Kirsten retired in June 2000 and recently enjoyed the births of twin sons to their son Alan and the wedding of their son Eric.

#### Graduate notes

(continued from page 18)

bound photochemical intermediates. These studies elucidate the effects of metal ions on the activation and subsequent reactivity of photolabile organic functionalities.

The Procter & Gamble Fellowship was awarded to **William E. Doering**. He graduated from the University of Minnesota-Morris in 1998 with a BA degree in chemistry. He is currently a doctoral candidate at IU under the supervision of Professor Shuming Nie. His research interests center around the use of metal nanoparticles for surfaceenhanced Raman scattering (SERS). He has examined the contribution of chemical enhancement to the SERS of single nanoparticles. Currently, he is working on the development of these nanoparticles as probes for bioanalytical applications.

Sarah A. Webb was the recipient of the E.M. Kratz Fellowship (endowed by Mr. and Mrs. W.W. Gasser Jr.). Webb received a BS degree in chemistry and a BA degree in German from Furman University in 1996. Following graduation she received a Fulbright Fellowship for study at the Institute for Organic Chemistry, Justus-Liebig Universität, Gießen, Germany, under the direction of Professor Dr. Junes Ipaktschi. She began her graduate studies at IU in 1997 under the direction of Assistant Professor Martha G. Oakley. Her research in the Oakley group has focused on molecular recognition events between cytoskeletal proteins and cellular phospholipids. This ongoing research involves the synthesis of polymeric analogs of phosphatidylinositol-4,5bisphosphate (PIP<sub>2</sub>) and investigations of their biological activity in modulating signal transduction pathways.

The Richard Slagle Fellowship was awarded to Khuloud Jaqaman. She received a BS degree in physics from Birzeit University in the West Bank in 1998. She started graduate studies in the Department of Chemistry at IUB in fall 1998. Under the direction of Distinguished Professor Peter Ortoleva, she does research in molecular modeling, with particular interest in drug-target interactions and large-scale macromolecular conformational changes. The unique features of the model being developed are based on ideas from statistical mechanics and thermodynamics, where the effects of the bioelectrolyte medium are accounted for using notions from the mesoscopic theory of interfacial phenomena. A novel method based on space warping is being developed to greatly accelerate the simulation of large systems. The project is carried out in collaboration with Eli Lilly and Co.

Two students held National Science Foundation Fellowships. **Jennifer M. Kindy**, who received a BS in chemistry from Wake Forest University, is a second-year student of Professor and Robert and

(continued on page 20)







▲ Research Award winners, from left, are Gerardo Gamez, Mark R. Herbert, Lori A. Watson, David C. Johnson II, Aurora E. Clark, and Danielle M. Goken.

 Thai Fellowship winners are, from left, Vanvimon Saksmerprome and Parichatr Vanalabhpatana.

### AROUND IU CHEMISTRY

#### Graduate notes

(continued from page 19)

Marjorie Mann Chair David E. Clemmer. **Lori A. Watson**, a graduate of the University of Kentucky with a BS in chemistry, is a third-year student of Distinguished Professor Kenneth G. Caulton.

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. Fellowships were awarded to Lewis J. Belcher, Sarah B. Cortright, Robert T. Hart, Mark. R. Herbert, Robert L. Karlinsey, Brian J. Kraft, David K. Leahy, Tara C. Lorenz, Denise M. McClenathan, Timothy P. O'Dea, Renã A. Sowell, and Benjamin J. Wozniak.

Other fellowship recipients were **Michael R. Mayer**, American Heart Fellowship; **Parichatr Vanalabhpatana**, Anandhamahidol Foundation Scholarship; **Amy L. Rosen**, College of Arts and Sciences, Graduate Division, Merit Predoctoral Fellowship; **Gerardo Gamez** and **Benjamin J. Wozniak**, Dean's Fellowships; **Erich W. Baum**, **James R. Sawyer** and **W. Jake Vickaryous**, Paget Fellowships; **Vanvimon Saksmerprome**, Royal Thai Government Fellowship; and **Jennifer M. Kindy** and **Amy L. Rosen**, Women in Science Fellowships.

Research and University Graduate School Fellowships were awarded to Amit Agrawal, Jason T. Ash, Lewis J. Belcher, Gregory H. Cohen, Sarah B. Cortright, Amie L. Cox, Andrew F. Donnell, Gerardo Gamez, Somdatta Ghosh, Danielle M. Goken, Jack L. Hayes, Mark R. Herbert, Richard D. Hoang, David C. Johnson, Michael J. Johnson, Jennifer M. Kindy, Grady B. Knight, Stormy L.A. Koeniger, Peter J. Mikulecky, Daniel Mutnick, Sunnie Myung, Benjamin M. Nugent, Duane A. Rogers, Amy L. Rosen, William E. Running, Ann M. Staub, Lori A. Watson, Michael R. Webb, and Benjamin J. Wozniak.

#### Annual honors and awards

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

Bernard Berk Fellowship: Rajesh Viswanathan

*E. Campaigne C500 Award*: Gerardo Gamez and Mark R. Herbert

Wendell P. Metzner Memorial Award: David C. Johnson II

*William H. Nebergall Memorial Award*: Lori A. Watson

Charles N. Reilley (Pharmacia Corp.) Award: Danielle M. Goken

Felix Haurowitz Award: Aurora E. Clark

Shell Associate Instructor Awards: Jack L. Hayes, Mark R. Herbert, Amy E. Hilderbrand, Rick J. Mullins, and Lori A. Watson

### PhD degree recipients

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

**Alvarez-Hernandez, Alejandro** (organic, Roush, October 2001), faculty position, University of Hidalgo, Mexico.

Antonelli, Stephen M. (organic, Widlanski,



#### Special award goes to PhD recipient

An Esther L. Kinsley PhD Dissertation Award for 2001-02 was recently bestowed upon Anne Counterman for her dissertation. "Conformations of Anhydrous Peptide Ions." It is the highest honor for research that Indiana University bestows upon a graduate student. IU awarded 200 PhDs in 2001-02, and only three degree recipients were given the Kinsley PhD Award.

Fellowship winners, first row, from left, are Khuloud Jaqaman, Rajesh Viswanathan, Brian J. Kraft; second row: Andrew W. Szumlas, William E. Doering, Jennifer M. Kindy; third row: Amita Datta, Sarah A. Webb, and Lori A. Watson. August 2001), senior scientist, ArQule, Inc., Woburn, Mass.

**Bredeweg, Todd A.** (physical, de Souza, July 2001), postdoc, Los Alamos National Laboratory, Los Alamos, N.M.

**Cherry, Brian R.** (physical, Zwanziger, July 2001), postdoc, Sandia National Laboratories, Albuquerque, N.M.

**Chiang, Ming-Hsi** (inorganic, Christou, July 2001), postdoc, Argonne National Laboratories, Argonne, Ill.

**Counterman, Anne E.** (analytical, Clemmer, December 2001), postdoc, Pennsylvania State University, State College, Pa.

**Davin, Brian P.** (physical, de Souza, December 2001), postdoc, Indiana University, Bloomington, Ind.

**DeSelms, Robert H.** (organic, Grieco, June 2002), Sterne Kessler Goldstein & Fox, Washington, D.C.

**Ferrando-Miguel, German** (inorganic, Caulton, November 2001), postdoc, ETHZ, Federal Institute of Technology in Zurich, Switzerland.

**Heidebrecht, Richard W.** (organic, Williams, January 2002), postdoc, the University of Texas at Austin, Texas.

**Hoaglund Hyzer, Cherokee S.** (analytical, Clemmer, October 2001), senior analytical chemist, Eli Lilly & Co., Indianapolis, Ind.

Hollenbeck, Jessica J. (biological, Oakley, May 2002), postdoc, University of Wisconsin, Madison, Wis.

**Hong, Mingfang** (analytical, Novotny, December 2001), scientist, Bristol-Myers Squibb, Hopewell, N.J.

**James, Ryan R.** (analytical, Hites, October 2001), scientist, Battelle Memorial Laboratories, Columbus, Ohio.

**Ji, Chang** (analytical, Peters, December 2001), postdoc fellow, University of Guelph, Ontario, Canada.

**Kazantsev, Alexei V.** (biological, Pace, December 2001), postdoc, University of Colorado, Boulder, Colo.

Lane, Gregory C. (organic, Roush, December 2001), scientist, Bristol-Myers Squibb, New Brunswick, N.J.

Lehn, Scott A. (analytical, Hieftje, October 2001), postdoc, Pacific Northwest National Laboratory, Richland, Wash.

**Mayer, Michael R.** (biological, Stone, May 2002), project coordinator, Southeast Colloboratory for Structural Genomics, Athens, Ga.

**McDonald, Jeffrey G.** (analytical, Hites, May 2002), forensic research chemist, Federal Bureau of Investigation, Quantico, Va.



Paget Fellowships are, from left, James R. Sawyer, W. Jake Vickaryous, and Erich W. Baum.



Navarro-Llobet, Diana (inorganic, Chisholm, March 2002), postdoc, Imperial College, London, England.

**Pihakari, Katianna A.** (physical, Davidson, August 2001), postdoc, Indiana University, Bloomington, Ind.

**Srebalus Barnes, Catherine A.** (analytical, Clemmer, December 2001), senior analytical chemist, Lilly Research Laboratories, Indianapolis, Ind.

**Staroverov, Viktor N.** (physical, Davidson, July 2001), postdoc fellow, Rice University, Houston, Texas.

#### **MS** degree recipients

Brunick, Linda K. (biological, E. Raff, May 2002).

Byassee, Tyler A. (analytical, Nie, March 2002).

**Gill, Katherine J.** (analytical, Hites, August 2001).

Grøn, Ole A. (analytical, Hieftje, March 2002).

**Gugliotta, Anthony G.** (analytical, Hites, May 2002).

Fellowship winners are, from left, Gerardo Gamez, Jennifer M. Kindy, and Amy Rosen.

Khalil, Ashraf F. (physical, Ortoleva, October 2001).

**Kimble, Kyle W.** (physical, Nie, January 2002).

**Plotkin, Michael A.** (organic, Johnston, November 2001).

**Shaw, Bradley J.** (analytical, Hieftje, March 2002).

**Sporleder, David P.** (physical, Ewing, December 2001).

**Wu, Peng** (organic, Caulton, November 2001).

# MAT degree recipient

Snyder, Neil (June 2002).



During the 2001-02 academic vear. Professor Romualdo deSouza served as director of undergraduate studies, and in July 2002 we welcomed Professor Dennis Peters into the role of director of undergraduate programs. Steven M. Wietstock continued as the coordinator of instructional programs. In August 2002, the Instructional Support Office was renamed the Undergraduate Office, and we have undergone some remodeling to better service the undergraduate students. The other members of the Undergraduate Office are Heather Kidd. student records assistant: David Felker, manager of instructional computing; Alice Dobie-Galuska, general chemistry assistant coordinator; and Judy Summerville, scheduling and registration manager. The Undergraduate Office 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.

he fall 2001 recruiting program was once again a success. We had 15 companies that gave 171 interviews during the recruiting season. The companies that were on campus last fall included Abbott Laboratories, Array Biopharma, Axys Pharmaceuticals, ComChem Technologies, Dow AgroSciences, Eli Lilly & Co., General Electric Co., the Lubrizol Corp., Merck & Co. Inc., National Starch & Chemical, Pfizer Inc., Pharmacia Corp., Procter & Gamble Co., Schering-Plough Corp., and Stepan Co.

Our fall recruiting program for 2002 is under way, and we are always looking for new companies to join our program. 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 at IU. 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 16 in Alumni Hall of the Indiana Memorial Union. The following awards and honors were presented this year:

• R.J. Grim Scholarships for 2000-01

Class of 2005: Nicholas Richard Abel, Kathryn Mc Govern Calhoun, Stephen Jess Helms, Laura Marie Slieker, Nicole M. Vincent

Class of 2004: Andre Gerardo Melendez, Andrea Lindsay Nold, John Michael Zaborske

Class of 2003: Allyson Noelle Fisher, Tanisha L. Simmons

Class of 2002: Justin David Brown, Mariya K. Chhatriwala

• Lubrizol Scholarships for 2001-02: Peter B. Conrad, Rolando Wray De Angelis, Samay Jain, Annabeth Ryder

• National Starch & Chemical Co. Scholarship for 2001–02: Heather Elizabeth Burks, Chad H. Weaver, Matthew Michael Zipse

• Beckman Scholars (awarded by the College of Arts and Sciences): **Heather Elizabeth Burks**, **Peter B. Conrad** 

• Chancellor's Scholar (awarded by IUB Chancellor Sharon Brehm): Katarzyna A. Mastalerz

• Presidential Scholarship: Cecilia Yuen-Man Cheng

• Research and University Graduate Undergraduate Scholarship: Cecilia Yuen-Man Cheng

• Andrew Loh Scholarship for Analytical Chemistry for 2002–03: **Michael Aaron Goodman**  • The Francis and Mildred (Eckerty) Whitacre Scholarship for 2002–03: Clifford Wright Brooks, Katarzyna A. Mastalerz

• The William Klinkenbery Schoarship for 2002– 03: **Peter B. Conrad** 

• The John H. and Dorothy McKenzie Scholarship for 2002–03: **Matthew Michael Zipse** 

• John H. Billman Summer Scholarship for 2002: Stephen Meredith Spencer

• The Jeay Dreyfus Boissevain Undergraduate Summer Scholarship for Excellence in Chemistry for 2002–03: **Robert Givens Kellogg** 

• The Votaw Undergraduate Summer Research Scholarship for 2002: Maxim Kostylev, Katarzyna A. Mastalerz, Charles Chauncey L. McCrory, Shawn Travis Greathouse, John Michael Zaborske

• The Lilly Organic Undergraduate Summer Research Scholarship for 2002: Andrea Lindsay Nold

• Pharmacia & Upjohn Inc. Summer Scholarships 2002: Peter B. Conrad, Rachael Cathleen Fisher, Robert Givens Kellogg, Christina Nicole Linton, Paras Batuk Ramolia, Jan Harold Riccius

• Harry G. Day Summer Scholarships for 2002: James T. Patterson, Matthew Michael Zipse

• Honors Division Summer Scholarships for 2002: Cecilia Yuen-Man Cheng, Maxim Kostylev, Katarzyna A. Mastalerz, Charles Chauncey L. McCrory, Christian Thomas Ross, Troy Sagan Alexander, Shawn Travis Greathouse, Paras Batuk Ramolia, John Michael Zaborske

• Russel & Trula Sidwell Hardy Scholarship: Andrea Lindsay Nold

• Merck Index Awards: **Amy M. Fang**, **Maxim Kostylev**, **Sara Otten Moellers**, **Jennifer Christine Takach** 

• Analytical Chemistry Award: Heather Nicole Brown

• Enola Rentschler Van Valer Trafford Scholarship Award: Heather Elizabeth Burks, Natalie Marie Best

• William H. Bell Awards: Samay Jain, Charles Chauncey L. McCrory, Lauren Suzanne Weddell

• Hypercube Scholar Award: Annabeth Ryder

• Joseph B. Schwartzkopf Award: Jennifer Anne Challgren

• ACS Award: Anna Izabela Krauze

• Mary Frechtling White Award: Mackenzie Anna Ford

• James C. White Award: Matthew Hardin Nett (continued on page 25)

# OUT & ABOUT WITH ALUMNI

# ALUMNI PROFILE: Raima Larter

Professor Raima Larter was instrumental in establishing the chemistry graduate program at IUPUI and directed the first student to receive the PhD in chemistry from IUPUI. She has directed the research work of 16 undergraduates, 11 graduate students, and three postdoctoral fellows. She has taught the elementary course for chemistry majors as well as the one for non-majors and graduate courses in kinetics and thermodynamics. Along the way, she received the Glenn W. Irwin Experience Award, the Faculty Research Award, and the Faculty Colloquium on Excellence in Teaching Award. She is co-author of many research papers and of a book, with K. Showalter, on Non-linear Science: A Multidisciplinary Textbook, Cambridge University Press, 2000.

Larter's Web site (www.chem.iupui.edu/People/Faculty/Profiles/Larter.html) identifies her research as being in the area of "nonlinear dynamics; chemical oscillations and chaos, and the chemical basis of dynamical disease." Working with doctors in the School of Medicine, she has developed a mathematical model that simulates the behavior of groups of brain cells or neurons. She has carried out "computer experiments" that allow her to test theories about the way an epileptic seizure spreads across the brain. These simulations have shown that the spread of a seizure may be due to an unusually fast communication time between groups of otherwise healthy neurons.

Our department is proud to have had a role in the career of this extraordinarily gifted and versatile scientist. We will follow future developments in her career with great interest.

attended IUB in the late '70s and received my PhD under the direction of Professor Peter J. Ortoleva in 1980. I had interviewed nearly all the faculty before choosing Peter's group; it was the strong interdisciplinary flavor of his work, as well as his efforts in cell modeling, that really attracted me to his field of study: nonlinear science. Peter was a physicist who had a joint appointment in chemistry and geology; my thesis work was on a problem in developmental biology, so we really tried to cover all the bases in our work together!

Following a postdoc at Princeton where I worked with Professor Herschel Rabitz, I joined the faculty at IUPUI. For two years, I was a parttime, non-tenure-track lecturer, but I moved to tenure-track status when an opening became available. I gradually moved up through the ranks and am currently full professor and chair of the department. The IUPUI Department of Chemistry is less than a third the size of the IUB Department of Chemistry in terms of faculty, but during my years here we have worked to establish a full-fledged graduate program without sacrificing the quality of our undergraduate offerings.

I was proud to be the first faculty member in our department to direct the research of a PhD student, Curt Steinmetz, who received his doctoral degree in 1991. Since that time, the number of graduate degrees awarded by our department has grown steadily, and I was, until very recently, in the midst of this expansion, directing the research of students at both the graduate and undergraduate levels. I have continued in the field of nonlinear science, which I was introduced to in Peter's group so many years ago. Topics I have worked on have included chemical chaos in enzyme kinetics, enhancement of membrane transport by spatial nonuniformities and, more recently, the dynamics of epileptic seizures and calcium oscillations in the brain.

— Jack Shiner

In recent years, I have turned my attention to administration, serving for two years as associate dean of the faculties and for the last two years as chair of the Department of Chemistry. I have been heavily involved in the development of a general education framework for the IUPUI campus and have also worked to develop ties between the School of Science and the School of Education for teacher training programs. My early history as a part-time faculty member has given me a unique perspective that many administrators don't have. In addition, I have always tried to remember, when decisions need to be made, what it is like to be a student in a large university. As I learned many years ago in Bloomington, helping students get involved in the academic community, especially a small one like a department, can lead them to places they never dreamed possible!



Raima Larter

#### \*

'I have always tried to remember, when decisions need to be made, what it is like to be a student in a large university.' — RAIMA LARTER

\*

#### ALUMNI NEWS



# 15 YEARS AGO

William "Flick" Coleman, PhD'70 (Ward Schaap), received a Chemical Manufacturer's Association Catalyst Award for distinguished teaching. He is professor and chair of the Department of Chemistry at Wellesley College.

Max Marsh, BS'47, retired from Eli Lilly and Co. after 43 years of service. He received this department's Award for Meritorious Service five years earlier.

- Rupert Wentworth

**Jean Beckman**, PhD'77, was appointed professor of chemistry and interim dean of the College of Arts and Sciences at the University of Evansville in August 2001. She is also chair of the chemistry department. She was one of four recipients of the Dean's Teaching Award in the University of Evansville's College of Arts and Sciences in 1997.

**Gretchen L. Birbeck**, BA'90, of East Lansing, Mich., was named a recipient of the Rockefeller Brothers Fund Charles E. Culpeper Scholarship in Medical Science. She will receive \$100,000 a year for up to three years. She is an assistant professor at Michigan State University.

**Bruce A. Bowman**, BS'81, works in the applied physics laboratory at Johns Hopkins University and was selected for inclusion in the 2003 edition of *Who's Who in America*. He lives in Herndon, Va.

**Todd Brugel**, PhD'00, and **Michael P. Clark**, PhD'01, have each taken senior research scientist positions at Procter & Gamble in Mason, Ohio.

Walter Lowry Caudill, PhD'83, and Alfred Childers, PhD'86, had formed an analytical services company for the pharmaceutical industry, which they named Magellan Laboratories. Professor Gary Hieftje tells us that after several highly successful years, they have sold their business to another larger firm. Caudill was a student of Mark Wightman's when the latter was in our department, and Childers was a student of Hieftje's.

**Michael H. Chow**, BA'73, owns a dental practice located in Nashua, N.H.

**Guillermo Cortez**, PhD'00, began a position in August as senior research scientist at Eli Lilly after completing a postdoctoral appointment with Professor Daniel Romo at Texas A&M University.

**Ralph E. Christoffersen**, PhD'64, opened an office in Boulder, Colo., for California-based Morgenthaler Ventures, where he will scout biotech investments nationwide. He is chair of the Colorado Biotechnology Association. He lives in Boulder.

**Robert L. Cullers**, BS'59, MAT'62, has decided to go into semi-retirement as a professor at Kansas State University. He lives in Manhattan, Kan., with his wife, Marianne D. Cullers, BA'60.

Linneaus C. Dorman, PhD'61, and his wife, Phae Dorman, received the Saginaw Valley State University's Distinguished Service Medallion for service to the university and community. Linneaus is retired from Dow Chemical Co. and holds nearly 30 U.S. patents and one in Canada. They live in Midland, Mich.

**Philip A. Downing**, BA'93, is the manager of analytical service for BAS Evansville, a division of Bioanalytical Systems Inc. He lives in Newburgh, Ind.

**Ulrich Emde**, postPhD'00-'01, is a senior research scientist with Merck KgaA, Germany.

**Steven R. Emory**, PhD'99, an assistant chemistry professor at Western Washington University, received a \$20,000 Dreyfus Foundation Faculty Start-Up Grant. He plans to use the award to purchase equipment and supplies to launch undergraduate research efforts. He lives in Bellingham, Wash.

**Michael A. Fowler**, BS'88, MBA'95, married Wendy A. Clark, BS'93, on Nov. 10, 2001. He is a group financial analyst at Rexnord Link Belt in Indianapolis.

**Gennaro Junho Gamma**, PhD'94, works at the Center for Technology Transfer at the University of Pennsylvania, where he manages and commercializes technologies in the fields of materials and nanotechnology.

Jack M. Gill, PhD'63, ScD'01, founder and general partner of Vanguard Venture Partners, received the Velocity Award in recognition of his lifelong contributions to entrepreneurial careers and support of the IU Kelley School of Business. The award was presented at the third annual Velocity Conference. He lives in Houston, Texas.

Mark M. Hamilton, BA'88, MD'92, co-authored the article "Laser Hair Removal Update" in the August 2001 issue of *Facial Plastic Surgery* and was author of the article "Aesthetic Plastic Surgery," published in the official *Journal of the Society of Aesthetic Plastic Surgery*. He is actively involved in teaching facial plastic and reconstructive surgery at IU and is a facial surgeon at Perkins Hamilton Facial Plastic Surgery in Indianapolis.

**Todd Hamilton**, PhD'96, is chair of the chemistry department of Adrian College, Michigan.

**Kent V. Hasen**, BA'91, BS'91, writes, "I will be finishing up a plastic surgery residency in 2002 at Northwestern University. I was married to Dellene Swanson in Chicago, on Aug. 24, 2001."

It is pleasing to report that **Chester (Chet) A. Jastremski**, BA'63, MD'68, who had practiced family medicine from 1972 until 1979 and retired due to rheumatoid arthritis, returned to a family practice in 1991. He has continued in active practice since that time, as well as teaching a kinesiology course at IU.

**C. Kammler**, PhD'02, has begun an academic appointment as assistant professor at Antioch College, Yellow Springs, Ohio.

**Franz David Klingler**, postPhD '86–87, is senior scientist at Boehringer-Ingelheim, Germany.

Vibhuti Klingler-Dabral, postPhD'87, and two business partners have recently started a new custom synthesis company. Klingler-Dabral is the managing director of Biodetek, Bensheim, Germany.

**Daniel Labar**, postPhD'85-86, is currently the head of radiochemistry at the Universite Catholique de Louvain in Belgium.

## OUT & ABOUT

#### Alumni news

(continued from page 24)

**Martha F. Lace**, BA'36, writes to say that she is enjoying playing lots of duplicate bridge and dancing with her "new" husband of eight years. She lives in Verona, Pa.

**Sanford H. Lawrence**, BA'41, MD'44, whose interest and research in biochemistry have contributed to his worldwide standing as an immuno-chemist, is listed in many of the major biographical publications.

James R. Locker, PhD'82, was recently named chair of the department of chemistry at Washington College in Chestertown, Md. He is the Clarence C. White Associate Professor of Chemistry.

**Sam Maravilla**, BS'50, after completion of approximately 40 years service with U.S. Steel and Lehigh Portland Cement Company, retired in January 1988. He has since been an independent consultant with the company he founded, Wellcem Tech Services.

William G. Mays, BA'70, MBA'73, ScD'00, of

Indianapolis, recently received a Spirit of the Prairie Award from Conner Prairie. The award recognized leaders with an Indiana background who have forged new frontiers. He is the president of Mays Chemical Co. Inc. and is a director on the boards of Anthem Insurance Inc., Vectren Corp., Indianapolis Chamber of Commerce, United Way of Central Indiana, Indianapolis Convention and Visitors Association, and the IU Foundation. Mays wrote last spring to send us a copy of an article that appeared in *Black Enterprise* in June 2001, titled "Finding the Right Formula for Success," about the Mays Chemical Co.; it was described as having "mixed equal parts science and business sense to take it from the test tube to the top of its industry" and was named Company of the Year by Black Enterprise magazine.

Jason A. Mears, BS'99, was married to Jennifer A. (Kurtz) Mears, BS'98, on June 8. They live in Birmingham, Ala., where Jason is a PhD candidate in biochemistry at the University of Alabama. Jennifer is working as a lab technician at Henderson & Walton Women's Center.

**Fred L. Metz**, PhD'62, has retired as senior chemist at the U.S. Environmental Protection Agency. He and his wife, Judy, live in Falls

(continued on page 26)

# 25 YEARS AGO

**Gary Wiggins** was appointed director, IU Chemistry Library and Chemical Information Center.

The incoming class of graduate students was larger than in previous years: Sixty-one new students were admitted, including 17 from the East and West coasts, more than we had ever received before.

- Rupert Wentworth

## AROUND IU CHEMISTRY

#### Undergraduate notes

(continued from page 22)

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 all of our graduating seniors for a long and successful career.

In addition to the students who received scholarships to stay on campus to work on their research projects, the department was awarded a Research Experiences for Undergraduates (REU) grant from the National Science Foundation that brought 10 additional students from other schools for a summer research experience during summer 2002. The summer research students participated in seminars on research ethics, career planning and placement, writing research papers, and graduate studies. The summer program culminated in an Undergraduate Research Symposium, where each student presented a poster of the work that they accomplished over the summer. The REU program was a great experience for all of the participants, and we look forward to hosting additional students in the future.



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. Charles McCrory, right, presents his work to a graduate student at the Undergraduate Research Symposium 2002.

### OUT & ABOUT

#### Alumni news

(continued from page 25)

Church, Va.

✤
New feature

We are pleased to invite short letters for publication so that we can learn what you are thinking and what you would like to see in *IU• Chemistry*. Send letters to Rupert Wentworth, Department of Chemistry, Bloomington, IN 47405, or send them via e-mail to rwentwor@ indiana.edu. Please include your mailing address and your telephone number. Text should be confined to 100 words or less and may be edited for space, clarity, and appropriateness.

50 YEARS AGO

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William E. Hatton, BS'52, received the gold medal from the American Institute of Chemists for his outstanding scholarship and his aptitude for chemical research.

Walter J. Moore and Vernon J. Shiner joined the department. (We celebrate Walter Moore's life on page 27 of this issue.)

Another full-time typist was added to the office staff, making three in all.

— Rupert Wentworth

**Kristy K. Michael**, BS'99, writes, "I'm currently a graduate student in the department of biochemistry and molecular biology at the University of Louisville."

**Brian J. Myers**, PhD'00, is now assistant professor at Ohio Northern University, Ada, Ohio.

**Katsuhide Ohi**, postPhD'99-'02, has just begun an academic appointment as instructor at Kitasato University, Japan.

**A.J. Pampalone**, BA'94, is a third-year internal medicine resident physician at Lutheran General Hospital in Park Ridge, Ill. He will serve as the chief resident during his fourth year and then plans to go to IU Medical School to complete a specialty area.

**Jeffrey A. Platt**, BA'80, DDS'84, MS'96, will hold an endowed faculty position named to honor the memory of his mentor Ralph W. Phillips at the IU School of Dentistry in Indianapolis.

**David K. Richie**, BS'68, of Hoover, Ala., is the owner of Titan Coatings Inc., an industry coatings manufacturer.

**Leslie A. Robinson**, PhD'89, has recently become director of medicinal chemistry at Deltagen Research Laboratories in San Diego, Calif.

**Beth E. Schilling**, BA'76, is executive director of drug safety at Bristol-Myers Squibb in Evansville, Ind. She lives in New Harmony, Ind.

**Elisa J. Seddon**, PhD'01, and her husband, Eric, celebrated the birth of their child, Owen Lewis, on Nov. 20, 2001. They live in Cleveland, Ohio.

**Henry M. Selke**, BS'99, a student at Kirksville College of Osteopathic Medicine in Missouri, has returned to Kabula, Kenya, to help break ground for a new medical clinic. Beside the clinic, named after Selke's late father and IU Professor Bill Selke, is a new library and a pre-school.

**Mona Franck Smith**, BS'50, writes that after bringing three children to adulthood, she returned to full-time work in information retrieval and database development. Currently she provides online references for prior art and novelty for patent applications at the U.S. Patent and Trademark Office, Biotechnology and Chemical Division.

E. Paul Smith, BA'51, special agent emeritus of Prudential Insurance of America, earned the Prudential Community Champions Rising Star Award for his work at the Indiana Veterans' Home. **Richard G. Smith**, MAT'70, retired from Bexley High School, Columbus, Ohio, after 35 years of teaching chemistry. During 21 of those years, he was also department chair. He is co-author of several high school chemistry books. He and his wife have relocated to Ocean Isle Beach, N.C.

**Richard A. Snapp Jr.**, BS'77, of Bloomington, Ind., was recently promoted to vice president of systems administration for Cook Group Inc. Snapp has been employed with Cook for 19 years.

**George K. Stookey**, BA'57, received the 2002 Research in Dental Caries Award during the International Association for Dental Research's general session in San Diego. He is a Distinguished Professor at the IU School of Dentistry in Indianapolis.

James E. Van Verth, PhD'57, is professor emeritus at Canisius College. He is currently editing the *Canisius Chemistry Newsletter* and managing the department Web page. Oh yes, he also plays the flute with several musical groups.

**Emmanuel Vrancken**, postPhD'00-'01, is now assistant professor at Universite Pierre et Marie Curie, Paris, France.

**Diane M. Wagrowski-Diehl**, PhD'99, of Holyoke, Mass., works for Water Corp. as a senior applications chemist. She was married to Bruce Diehl in November 2001.

**Rebecca Gail Wallihan**, BS'00, currently enrolled in the IU School of Medicine, had her shot at fame last year. The Wells Scholar and tennis standout participated in the Indianapolis tryouts for the ABC show "Who Wants to be a Millionaire" and was chosen to participate in the television show. She didn't take the top prize but walked away with \$64,000, which will no doubt help with all those loans students have these days.

**Donald P. Willis**, BS'51, MAT'56, is a retired high school teacher who taught at Elkhart High and Elkhart Central. He is involved in the Elkhart County Historical Society and his church. He lives in Elkhart, Ind., with his wife, Nancy J. Willis, BA'51, MAT'56.

James H. Wood, BA'70, who earned an MD from Johns Hopkins in 1973, has written or edited several textbooks and scientific articles in his field of the neurochemistry of cerebrospinal fluid, cerebral blood flow, electrical brain stimulation and epilepsy. He is currently consultant neurosurgeon at the Medical College of Georgia (Atlanta).

## Necrology

We have received notices of the deaths of several of our alumni since the 2001 issue of  $IU \bullet$  *Chemistry*, but with no further information:

William Henry Anderson, BA'49, Oct. 29, 2001

Max I. Bowman, PhD'37, Aug. 5, 2001

# In memoriam: Walter J. Moore (1918-2001)

Walter J. Moore, former research professor of chemistry at Indiana University and professor emeritus of physical chemistry at the University of Sydney, Australia, died at the age of 83 on Dec. 20, 2001, at Bloomington Hospital. The cause was kidney failure. Walter was a member of our department in one capacity or another for 42 years.

While well-known for his research, Walter was perhaps most famous for his undergraduate text *Physical Chemistry*. When it first appeared in 1950, it was the first to incorporate emphasis on quantum chemistry and the molecular aspects of physical chemistry. This new approach was widely accepted, and its impact persists to this day. His text became the standard of the field for almost 30 years. It was completely dominant in both the United States and overseas, appearing in four editions and in eight languages.



Walter G. Moore

Walter was born in 1918 in New York City. He finished his BS degree from New York University at the age of 19 and, at flank speed, his PhD in chemistry from Princeton University just three years later. He then joined Linus Pauling at the California Institute of Technology for a year of postdoctoral research as a National Research Council Fellow. He was involved in the Manhattan Project during the war years 1941–45.

His academic career began at the Catholic University of America (Washington, D.C.), where he remained five years before spending a year at the University of Bristol, England, both as a Fulbright Fellow and a Guggenheim Fellow. He joined the Indiana University chemistry faculty as a professor in 1952 and was appointed research professor in 1963. During his first 21 years at IU, his research evolved from solid-state chemistry to neurochemistry. He held visiting professorships at Harvard, the University of Paris, the University of Brazil, and the University of Queensland, Australia.

In 1974, Walter left IU to accept an appointment to the chair of experimental physical chemistry at the University of Sydney. In addition to his administrative duties, he became heavily involved in protein chemistry. One of the triumphs of his Australian research

was the determination of the shape of a protein that is almost certainly linked to the crippling mechanism of the disease multiple sclerosis. Including his work at IU, he was the author or co-author of more than 200 research papers in the fields of photochemistry, solid-state chemistry, neurochemistry, and protein chemistry.

(continued on page 30)

#### Necrology

(continued from page 24)

Richard Lee Brindle, BA'55, Jan. 15, 2002

**Ray C. Christena**, MA'48, PhD'51, Jan. 12, 2002

Reuben Allen Craig, BS'42, Oct. 28, 2001

John Blacklidge Dennis, BA'36, Jan. 2002

William H. Donovan, BA'48, Jan. 17, 2002

**Gaither Wayne Edwards**, BS'60, Aug. 27, 2001

**Daniel Mark Feinn**, BA'78, MD'84, Dec. 29, 2000

**Charles Fisch**, BA'42, MD'44, June 24, 2002

**Elizabeth Wiltse Fraser**, BS'42, Oct. 11, 2001

Gilbert W. Gambill, BA'43, Sept. 24, 2001 **Stephen Harold Garry**, BA'74, MD'77, March 23, 2002

**Norman Glanzman**, BA'68, MD'71, Jan. 9, 2002

James Joshua Groves, BA'30, July 20, 2001

Margaret E. Winslow Hall, BA'32, Oct. 11, 2000

**David D. Hartley**, MA'30, PhD'32, June 21, 2001

**Mary Gehres Hart**, MAT'56, Dec. 22, 2001

**Jack Hatfield**, BA'40, MD'43, April 27, 2002

Ned Phil Hehner, BS'51,

Oct. 14, 2001 Oliver M. Hitch, BA'39,

MD'42, May 3, 2002

**Clarence Joseph Hull**, MA'43, PhD'44, Oct. 6, 2001

**John F. Jackson**, BA'43, Nov. 15, 2001 Floyd L. James, BA'31, MA'32, PhD'37, Nov. 22, 2001

**Evan H. Lewis**, BA'34, MA'35, Aug. 8, 2001

Andrew F. Livovich, BA'40, Jan. 17, 2001

Mary Ann Mentendiek, BA'64; MD'67, March 30, 2002

Robert Wayne Mitten, BS'38, Jan. 10, 2002

**Dana Lee Mock**, BS'44, Oct. 10, 2001

**Raymond Morphew**, BA'41, MD'44, March 17, 2000

**Richard W. Neithamer**, PhD'57, Feb. 16, 2002

George Ewing Niles, BA'36, MA'36, May 30, 2000

Ronald Robert Reynolds, BA'48, MS Ed'53, Oct. 8, 2001

Mona Jane Wilson Schoch, BA'39, Nov. 7, 2001 Robert Wesley Scott, BA'48, Sept. 16, 2001

Phillip L. Smith, BA'41, July 8, 2002

William Edward Stansbury, BA'53, MD'56, Jan. 16, 2002

**Carole Sue Wyatt Stewart**, BA'59, PhD'85 (biochemistry), Aug. 24, 2001

**Ethel Constance Earle Stone**, BA'30, Feb. 8, 2002

**Edward John Swets**, BA'42, MD'44, July 31, 2001

John Peter Wakeland, BA'43, Nov. 30, 2001

Allen Isaac White, MAT'64, Oct. 13, 2001

**Dorsey Clinton Willis**, BA'26, April 19, 2002

**Charles Keith Wooldridge**, MAT'63, March 14, 2002

# reflections

# Frank Curry Mathers: A personal reminiscence by Lyman R. Caswell

Professor Frank Mathers taught me qualitative analysis in the spring semester of 1946. I remember the laboratory part of the course with fondness. Despite Mathers's tough little oral quizzes administered before one could get an "unknown" and upon reporting the contents of the "unknown," the laboratory was, for me, a lot of fun. The separations and tests prescribed in Mathers's little qualitative analysis laboratory manual worked very well, having been refined through many years of his experience. His oftenstated goal in his course was to teach descriptive inorganic chemistry. In keeping with that goal, he avoided the use of organic reagents as much as possible. The only organic test reagent used in his qual scheme was dimethylglyoxime for nickel, and the only indicator was litmus paper. Some of the tests were unique to this scheme. For example, the deep green color of 6-valent manganese confirmed the presence of that element in an unknown. There was a point in the procedure for the soluble anions at which the solution was evaporated to dryness in a crucible. If the sample contained both acetate and chlorate, the student was rewarded with a bright flash and a soft "poof" as the latter oxidized the former. Every student put together his or her own little hydrogen sulfide generator, using ferrous sulfide and hydrochloric acid, and there was a mini-hood at each work station to carry off the excess H<sub>2</sub>S.

I remember Mathers as a slightly dumpy man in late middle age, dressed in an old, dark-gray suit. The age of his suit was motivated by his passion for thrift. In almost every lecture, he would make some comment about how something was done in a particular way because that way was the cheapest method. In the qual lab, the bottle of ammonium molybdate solution was labeled in large, black letters, "Use only a few drops. This reagent is expensive." Mathers would watch the bulletin boards, and when the date of an event announced by a poster had passed, he would take the poster down and use the blank back side of it to create a poster of his own.

Mathers's lectures were well organized, interesting, and informative. He gave a very specific reading assignment at the end of each lecture, and he had a technique to make sure that they were read. He wrote the name of each student in the class on a little card. At the start of a class period, he shuffled the cards; then, as he gave the lecture, whenever he came to something covered in the reading assignment, he drew a card and fired a question at the student whose name appeared on it. This was always done in such a way as to emphasize the fact or point at which he had arrived in the lecture. Students who responded promptly with brief, correct



Lyman Caswell, a former student of Professor Frank Mathers

answers did well in the course. I learned a lot from him, and retained it.

I found Mathers's manner intimidating at first, but I soon found that he had a sincere interest in his students. He would have brief conversations with them, either singly or in small groups, probing background, interests, and general knowledge. On one occasion, I impressed him with my knowledge of the manufacture of "pearl" buttons from mussel shells. I don't recall how this subject came up.

A few semesters after Qualitative Analysis, I took Mathers's lecture course in Advanced Inorganic Chemistry. Like the qual analysis course, the material was largely descriptive, with a heavy emphasis on industrial methods and practical applications. Mathers's penchant for thrift came out very clearly in this course, when he examined the economics of various processes. Among the students it was said that, if you didn't know the answer to a question on one of Mathers's tests, you had a chance of being right if you selected whichever of the following three best fit the context of the question: "It's cheaper," "Water," or "Countercurrents." I think there was an element of truth in this joke. On one occasion, one of the test questions was, in his typically telescoped English, "Why not use  $(NH_4)_2SO_4$  for fertilizer?" When he returned tests, he commented that the answer he sought was that it makes the soil acid, but "some of you said it's 'too expensive,' and I gave credit for that."

Mathers's emphasis on the practical and the economic aspects of his chemistry influenced my

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Although he was born in Nebraska, Lyman Caswell grew up in Indiana. He earned two degrees (a BS in 1949 and an MA in 1950) in chemistry from Indiana University, before receiving his PhD from Michigan State University in 1956. Upon completion of his doctorate, he became head of the chemistry department at Upper Iowa University but, he says, "head" included the body because he was the entire chemistry faculty until a second person was added three years later. He joined the faculty at Texas Women's University in 1961, where he served as chair from 1967 to 1970 and again from 1978 to 1982. He and his wife, Lynda, who passed away in 1985, had three children. He remarried in 1986, this time to Ruth Hansen, and retired in 1994. They now live in Seattle, where his retirement activities include writing, philately, and research in the history of chemistry. He sent us the following story about a professor whose tenure in the IU Department of Chemistry spanned almost the first half of the 20th century.

- Rupert Wentworth



own teaching in later years. Whenever I lectured on practical chemistry or industrial procedures, I found myself taking the same approach. I always thought of Frank Mathers when I did it.

A semester or two after taking the advanced inorganic lecture course, I took Mathers's Advanced Inorganic Laboratory. Other than being done in a laboratory, this course bore no resemblance to the advanced inorganic preparations course offered today. Mathers was an electrochemist as well as an inorganic chemist. He consulted for a company that carried out the electrorefining of copper. The principal byproduct of this process was an anode mud that was 80 percent tellurium dioxide. Having no use for this material, they gave it Mathers. A keg of it. a dirty-white powder, stood in a corner of the advanced inorganic lab. The thrifty professor built his course from the free starting material. The student began by purifying the TeO<sub>2</sub>, then using this material to prepare representative compounds of tellurium in its positive oxidation states.

Tellurium has been called "the useless element." It is certainly the anti-social element. Contact with tellurium compounds quickly engenders an unpleasant "rotten-garlic" breath. All I did the first day in that laboratory was to weigh out the initial sample of crude tellurium dioxide and put it into solution. I was positive that I had not touched it or breathed its dust, but within a couple of hours I was garlicky. I had a date that evening. It was the last date I had that semester.

Among the students, the advanced inorganic lab had been nicknamed "Crystal Farming 101." Mathers expected the various preps to be produced not only in good yields, but also as wellformed crystals. When my prep of telluric acid did not have the expected crystal form, he gave me credit for it anyway, because "those are good crystals."

In the spring of 1950, as a first-year graduate student, I was the teaching assistant in Qualitative Analysis. In the interim, Professor Mathers had retired. Other than its general form, the qual course bore little resemblance to the course that I had taken. I think that generating H<sub>2</sub>S in situ from the hydrolysis of thioacetamide was definite improvement over the stinky traditional method, but a qual scheme replete with organic reagents and indicators was not the same. The colors were pretty, but I don't think the students learned as much. Today, Qualitative Analysis has faded from the curriculum, surviving only in very truncated form in the last few weeks of the second-semester freshman chemistry lab. I think Frank Mathers would be displeased.

# In memoriam: William E. Streib

We are sad to report that Bill Streib passed away in late June after a long illness. Bill had served the department in many capacities during the 37 years prior to his retirement in 2000. A native of North Dakota, he received degrees from Jamestown College and the University of North Dakota prior to getting his PhD from the University of Minnesota under William Lipscomb. He joined the IU faculty as an instructor in 1963 and advanced to assistant professor; he eventually took over responsibilities as director of laboratories when Chris Kaslow retired in 1971.

Bill continued an active program in X-ray crystallography throughout his tenure, and when the director of laboratories position was changed to director of business in 1985, he accepted the position of research crystallographer in the Molecular Structure Center. Perhaps one of his most notable achievements was the development of a personal computer operating system that was not only in all of the diffractometers at IU, but also in several other laboratories in the United States.



Bill and Kirsten Streib at Bill's retirement reception in 2000

He was the author or co-author on scientific publications that included more than 400 structures he had determined, many that required the unique low-temperature equipment and techniques that he helped develop.

Bill is survived by his wife, Kirsten (Folting) Streib, two sons, Eric and Allan, and three grandchildren.

— John Huffman

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### Late news

Warren H. Machleder, PhD'68, died Aug. 23. Born in New York City, Machleder grew up there and in New Jersey. He earned a bachelor's degree at New York University; he was one of Jack Crandall's first doctoral students.

Machleder was with Rohm and Haas Co. in research, marketing, and new business development for 30 years. He was also active in community affairs. He is survived by a son, Eric; a daughter, Jennifer; his mother, Dorothy Beer; and three brothers.

\*

# **Chemistry Honor Roll 2001**

Robert L. Ake. BA'60 Mark R., BS'83, & Ann Anderson Burton L. Appleton, PhD'58 George R. Aronoff, M.D., BA'72 Peter G. Arvan, MA'44 William E. Jr., MA'50, & Marv E. Bacon Kevin G. Baer, BA'86 Ann K. Bailey Steven M. Bakeis, BS'90 Jay R. Baker, BA'92 Linda J. Baker Craig A., BS'70, & Margaret A. Balliet John G. Baranko, BA'49 Helen B. Barnes, M.D., BA'38 John C. Bart, BS'89 Bradley B. Basinger, PhD'81 John C. Beauchamp, BA'86 Jean C. Beckman, PhD'77 James H. Beeson, BS'62 Mohammad Behforouz, PhD'65 **Bradley Bennett** Nicholas C. Bensko, MS'74 Ella M. Bettinger, BS'49 Lawrence A. Black, BS'77 James C. Blosser, BA'67 Alvin M. Borders, PhD'37 Max I. Bowman, PhD'37 Charles H. Boxman, BA'53 Malcolm, BA'38, & Mary E. Bray William W. Bromer, PhD'54 Scott E. Brown, BA'97 Robert R., BS'42, & Trudy Buck Warren, PhD'64, & Judith Buddenbaum, BA'62 Charles Bunnell, BA'69 Gay Burkhart John E. Burks Jr., PhD'79 Garv W. Caldwell, PhD'82 Ernest & Jean Campaigne

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#### In memoriam

#### (continued from page 27)

In 1983, Walter returned to Bloomington after retirement from the University of Sydney and was appointed adjunct professor of chemistry. He held this position for almost 20 years. His initial retirement years were spent with vigorous efforts to uncover source materials for his biography of physicist Erwin Schrödinger, a developer of quantum mechanics.

The biography *Schrödinger, Life and Thought* appeared to wide acclaim in 1989. The *New York Times* book review noted "it surpasses even the 'Double Helix' by James Watson in its examination of the most visceral drives of a great scientist." It was the subject of a full article in the *New Yorker* magazine and received an award for the most outstanding book of the year in its class from the American Association of Publishers. While we chemists think that Walter is most

famous for his text, his *New York Times* obituary (Dec. 31, 2001) placed the Schrödinger biography as his most celebrated accomplishment. It is still in print. (To my knowledge, Walter and Felix Haurowitz are the only IU faculty chemists to have had obituaries in the *New York Times*.)

Walter had a keen interest in philosophy as well as in the history of science and reviewed books on these subjects for national publications. He had an extensive collection of rare science books dating back to Sir Isaac Newton's *Opticks*, and hundreds of these valuable editions have been given to university libraries.

His gift of writing was often used to argue for social causes. In addition to other publications, his letters and comments have appeared in the Bloomington *Herald-Times*. For example, a series of articles concerned his efforts to have the retirement fund used by IU abandon its practice of investing in tobacco stocks. The existence of "social choice" funds in these investment services may in part reflect these efforts.

Many readers will have encountered Walter only by struggling through physical chemistry with his text. (The struggle would have been greater with someone else's text.) A few other readers will have had Walter as a classroom professor. But the luckiest amongst us knew Walter as a colleague and friend.

I am even more fortunate, having known Walter both as a distant student and later as a colleague. My first real appreciation of physical chemistry came from an undergraduate course using his text. I later had a more intensive connection when as a postdoc I taught the physical chemistry course in a Harvard summer session where, of course, Walter's text was used. These close encounters made me a fan of Walter J. Moore. His text was not only authoritative, *(continued on page 31)* 

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#### In memoriam

#### (continued from page 30)

but also eloquent, witty, and interesting.

I finally met Walter when I visited IU on a job interview. It was probably Walter who subliminally tipped my mental scales to IU in choosing between job offers. As a colleague, Walter was simply the best. He took a lively interest in the young faculty, and we were frequent guests of Walter and his wife, Pat, at their home. He kept a keen interest in what we were doing. Chemists had a daily lunch table at the Tudor Room, and we listened with delight to the intellectual duels between Walter, the unrepentant liberal,

and Ernest Campaigne, the (still) unrepentant conservative. In addition to Walter's interest in his colleagues, it was impossible for us not to be interested in Walter. His articulate acquaintance with philosophy and of art were fascinating, and his passionate arguing of social causes was stimulating. With penetrating questions from his center seat at physical chemistry seminars, Walter remained an invigorating presence even in his final years.

#### - Charles Parmenter

To give an illustration of Walter's less serious side that we remember so well, read a tongue-in-check letter that he wrote to our local newspaper in 1992. \*Reprinted with permission from the Bloomington Herald-Times, June 5, 1992.

#### Spoons supported

To the editor: I must take issue with Miss Manner's uncompromising statement that it is impolite to eat Jello salad with a spoon. Almost everything that we know about good table manners has been derived from the etiquette taught by nannies to British upperclass children in their nurseries. Hence the custom in England of calling all desserts "pudding" and eating them with a spoon. Now Jello is clearly a species of pudding and unless there is a compelling reason otherwise, should be eaten with a spoon.

When the Pilgrim fathers and mothers came to the New World, they brought their British canons of deportment with them. Archeological research suggests that in fact they had knives and spoons but no forks at all. Hence the custom of eating peas with a knife (now deplored among the middle classes). Miss Manners would argue, no doubt, that salads are a ruling class and hence take priority over any possible ingredients. I would contend that Miss Manners' concept is a mere theory and from a practical point of view, anyone actually confronted with a Jello salad should not make a spectacle of herself trying to convey the wobbly colloid on a fork, but should use what God clearly intended, a proper spoon.

- Walter J. Moore

#### Honor Roll

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