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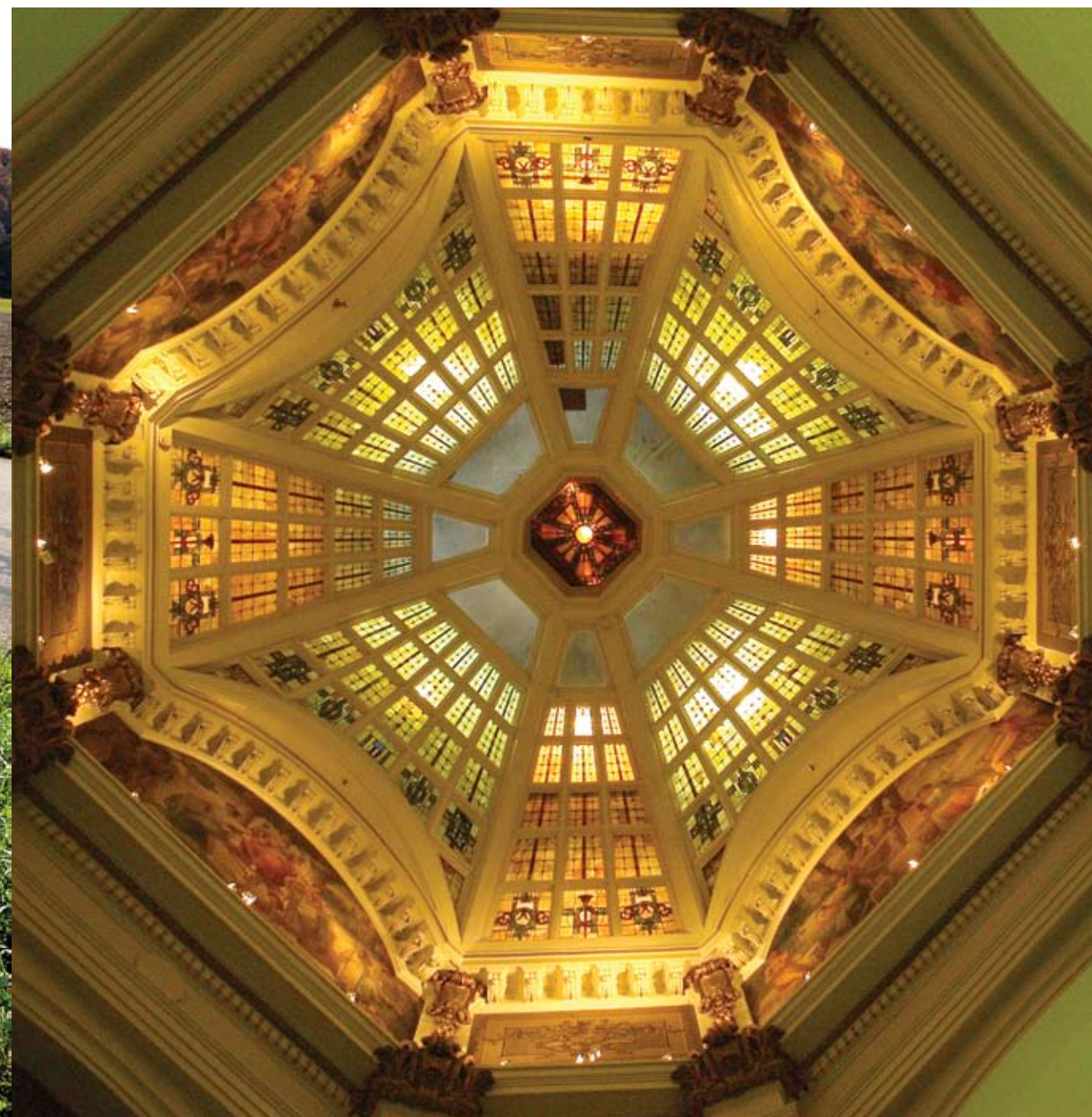
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**Ethanol:
The Fuel of
the Future?**

**Alchemy:
Fact or
fiction?**

**A fond
farewell to
friend and
colleague:
Rupert A.D.
Wentworth**

Ear Today and Here Tomorrow?

The ethanol-from-corn dilemma

by William & Rupert Wentworth

Corn (kôrn) *n.* Any of numerous cultivated forms of a tall annual cereal grass bearing grains or kernels on large ears with the grains or kernels used as food or fodder and yielding edible oil or starch.

That's a good definition ... it's certainly accurate. But is that all? Did the definition go far enough?

Aided and abetted by the Haber process for fixing nitrogen, the U.S. is the largest corn producer in the world. Moreover, corn is the largest crop in the U.S. with a record of about 12 billion bushels of corn grain in 2004. In any year, it is harvested from about 30 million hectares, roughly the area of Arizona and a bit less than one-quarter of all the cropland in the U.S. Indiana's corn production ranks fifth in the nation with almost 1 billion bushels during the same year.

This much corn forces corn producers to invent new uses for their product. One such use, the production of ethanol to be used as a biofuel,

either alone or mixed with gasoline, is spurred by Brazil's seemingly successful use of ethanol from sugarcane in automobile engines and the resulting decrease in Brazil's dependence on foreign oil.

Our use of corn for the same purpose makes much of the total yield of this product disappear — according to the National Corn Growers Association, about 13 percent of the harvest in 2004 was diverted from food or fodder into ethanol production. The U.S. Department of Agriculture estimated that 2.5 gallons of ethanol resulted from every bushel used in corn-to-ethanol production.

The ethanol-from-corn process is shown in the accompanying flow chart in highly simplified form. Fermentation of glucose with the formation of ethanol in the last step occurs with the release of carbon dioxide, a greenhouse gas. Depending on whether dry or wet milling is used, different types of livestock feeds are also by-products.

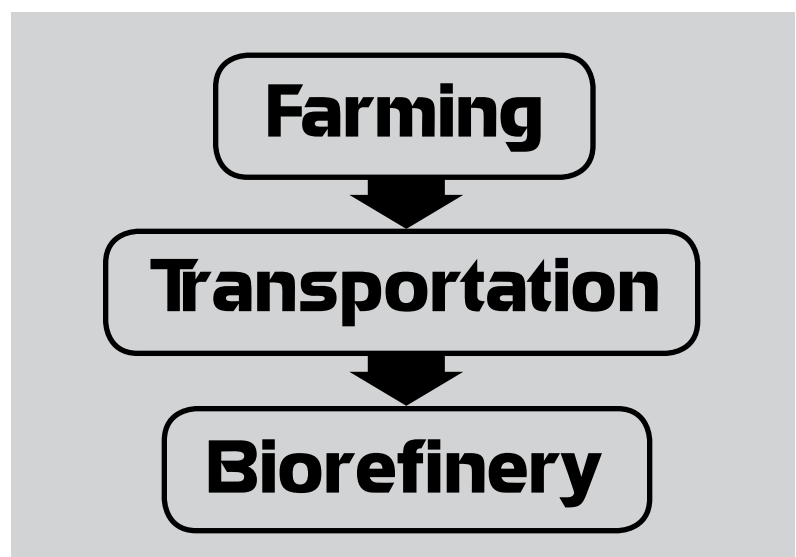


Proto-ethanol, sampled and approved by the field mice

The national effort has the support of many levels of the government. In an address at West Point, Va., in May 2005, President George W. Bush applauded the entrepreneurs who are creating the biofuels industry in the U.S. But applause is not all that the entrepreneurs have received. According to one estimate, they receive about \$3 billion annually from the federal and state governments.

Indiana's governor, Mitch Daniels, announced in August 2006 the "Hoosier Homegrown" energy plan that aims to

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Ethanol

(continued from page 1)



*One gallon of
isooctane, a
mathematical
substitute for
gasoline, will
provide, under
standard conditions,
1.4 times more
heat energy than
one gallon of
ethanol.*



replace imported energy sources. Ethanol from corn, along with biodiesel and clean coal, are the replacements.

Clearly, ethanol from corn is seen as an important means to decrease our local and national dependence on foreign imported oil. But at least two questions must be asked:

- Should we rely on ethanol from corn to achieve our energy goals?
- Is this industry, with its current underpinnings, sustainable?

Lack of space prevents us from considering an additional question: With carbon dioxide being released to the atmosphere during the production of ethanol as well as during its combustion, will the atmosphere be degraded still more if or when this new industry becomes prevalent?

The question of energy

Energy is involved in each step in the ethanol-from-corn process shown in the flow chart. Farming requires the input of considerable energy, with much of it expended in the manufacture, transportation, and use of fertilizers and pesticides. While transportation of the corn requires an obvious expenditure of energy, energy consumption in biorefining is by no means negligible. However,

energy credits for the salable by-products from the biorefinery, such as dried distiller grains, should be included because they displace other animal foods whose production requires energy.

The question of relying on the energy from ethanol produced from corn has been reviewed adequately at least twice elsewhere (*C&E News*, Jan. 1, 2007, p. 19, and *Scientific American*, January 2007, p. 42). Both agree that “corn-based feedstock is likely to be the start of a bio-fuels market, not its end” because “ethanol could displace gasoline, but it won’t pay off” until we use another feedstock.

What about sugarcane? Although Brazil’s use of this crop to achieve energy seems successful, the area in the U.S. where sugarcane crops can flourish is limited. But switchgrass, a summer perennial grass that requires little or no fertilizers and pesticides, is a possible new cultivar for achieving our goal. Progress in this area, however, awaits finding bacteria or fungi whose enzymes will break down cellulose under the conditions of a biorefinery.

The question of sustainability

Modern society is a linear process of chronic economic change through technological transforma-

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From the editor

Following in big footsteps: educator, editor, volunteer

This year’s *IU•Chemistry* has followed a much different path than past issues. I have worked on this periodical with Rupert Wentworth for the last three years, and I am sad to say this is the last year we will work together. As you will read herein, Rupert died in early September, but not before he made sure this year’s publication was planned and up to snuff. Rupert, an incessant writer and planner, had this year’s table of contents planned the day after that last issue went to press. He had been editor of this magazine for seven years, and for all intents and purposes, was the editor for this entire issue. His diligence, his eye for detail, his exacting nature continued the tradition of this fine magazine, building on what Ernest Campaigne, Max Marsh, and Jack Shiner prepared so well during the 1990s. I must take this opportunity to thank Toni Lady, Mary Swarthout, and Gary Hieftje for their support in this year’s process, as this issue would not have come together had it not been for their generous help. A special thanks goes to Julie Dales, former editor for constituent periodicals at the Alumni Association, for agreeing to work on this publication, for it is her page design that gave it its character for the last several years.

I owe a great deal of appreciation to Rupert, as he has treated me with a great deal of warmth and love since the first day I arrived at IU. I feel like I have followed in his footsteps in many ways. In the mid-’80s, while he was visiting Wayne State University Chemistry Department (my hometown and where my father was faculty), he told me I should come to IU for

graduate school. Although graduate studies at IU were not part of my future, I did come to IU seven years ago and acquired Rupert’s office the day after he moved out of the department, claiming his office furniture, many of his books, and even his fan, which still sits in the corner of my office. Rupert became coordinator of undergraduate chemistry in 1979; I now hold a similar position, assuming this responsibility in July. I am grateful to take on this next task of editing the *IU•Chemistry*.

For three years, I have volunteered alongside Rupert at the First United Methodist Church Pantry that runs every Wednesday, a food pantry he started in 1992 for people in need, and through this outlet he has introduced me to a great set of friends in the community. I will miss his unique sense of humor, especially during my favorite holiday, Halloween. Rupert had a great shtick for celebrating Halloween in his class. While performing some demo, he would drink a random solution, stagger and choke, fall down behind the table at the front of the room, and then pop back up wearing a Mr. Hyde mask. The class would literally howl in laughter at his “demonstration.”

I wish to thank Rupert for his guidance and friendship through my years in this department. I hope to pay tribute to his dedication to IU chemistry by continuing the tradition of a wonderful publication that keeps our alumni in touch with IU.

— Kate Reck

Ethanol

(continued from page 2)

tions, environmental exploitation, and the delay of full costs through unaccounted damage to human health (workplace and product safety) and to natural processes (pollution). From early modern times to the present, this process has been driven by increasingly greater needs for energy. This system knows no frugality or moderation. That means stagnation. Stagnation is an economic euphemism for dying. Grow or die.

Modern agriculture is one of many economic eddies within the larger linear process. Agriculture costs more energy than it produces. A farmer and a mule would starve given a similar deficit. We do not starve because society subsidizes agriculture on a vast scale. Our enormous wealth supports all of the energy inputs required to sustain agriculture: government redistributions of risk, research, chemical industries, transportation and farm machinery fuel (probably more than 40 percent of the energy used in agriculture), food processing, consumer markets, etc.

Corn farming is far out of ecological balance compared with other crops. By its oceanic acreage alone, it over-depletes and over-erodes soils. Corn yield is very dependent on chemical fertilizer and requires massive applications. This has its own costs. Most major U.S. field crops, but predominantly corn, are grown in the basin that drains into the Mississippi River. Fertilizer run-off creates a seasonally enlarging low-oxygen “dead zone” in the Gulf of Mexico. By the end of the summer growing season, the asphyxiated area expands to about the size of New Jersey and threatens the \$26 billion per year Gulf fishing industry. Moreover, corn economics depend heavily on huge government subsidies. Only intensive lobbying, constant borderline surplus, and cheap prices place corn as the politically obvious choice for an ethanol feedstock.

Unlike typical modern growth, sustainability is not linear. Sustainability implies circularity: giving back what is taken, healing what is stressed. For example, Amish farming in the U.S. is slightly older than capitalism itself. The basic techniques have changed little. Amish farmers are among the very best in the world: “We farm the way we do because we believe in nurturing and supporting all our community — that includes people as well as land and wildlife,” says a contemporary Amish farmer. Not only has their technique nourished them on small plots of land for more than 300 years, their soil has resisted erosion and retained its fertility. Their unsubsidized yields are greater than modern farmers, and they give off excess “energy” in the form of large profit margins.

Amish sustainability is accomplished largely without chemical fertilizers, diesel fuel, pesticides, or other costly inputs. Ergo, sustainability is possible. But their ways cannot be our ways.

We must think in different agricultural terms: restraining damage so that the planet does not become untenable. We must recycle and restore where possible. Even this small degree of cultural change will be resisted for the sake of short-term gain. The earth produces and sustains us, not the other way around.

Realistically, our “sustainability” will be more like renewability (carefully managing the conditions that repeat a desired outcome). Renewable biofuel production will entail intelligent and determined political leadership. Why? The economics of biofuel is different from that of natural gas and petroleum.

As the sun and earth become important partners in energy production, biofuel renewability will require commitment to a new infrastructure that, at the least, slashes energy wasted in transportation. This means two things: localized (and eco-friendly) production near growing areas and pipeline distribution on a scale that matches the labyrinth of oil and gas pipelines that currently crisscross the U.S.

Pay heed, Indiana: Ethanol from corn is not the panacea you hoped it would be, but other routes to this biofuel can be both profitable and renewable.

William Wentworth, a professor of sociology at Clemson University, is Rupert's brother.

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Unlike typical modern growth, sustainability is not linear. Sustainability implies circularity: giving back what is taken, healing what is stressed.
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Trivia about chemistry

? ? ?

All things in moderation, right? This includes your holiday dinner. Were you aware of the following carcinogens that naturally occur in your favorite holiday dinner fare? Of course, we would be sickened if we ate these foods in the amounts necessary to approach the reported LD-50 for their toxicity, but it's still fun to recognize that the food we eat has all sorts of chemicals in it, both good and “bad.”

- **Mixed roasted nuts:** aflatoxin, furfural
- **Red wine:** ethyl alcohol, ethyl carbamate
- **Roast turkey:** heterocyclic amines
- **Bread stuffing (with onions, celery, black pepper, and mushrooms):** acetaldehyde, ethyl alcohol, benzo(a)pyrene, ethyl carbamate, furan derivatives, furfural, hydrazines, d-limonene, psoralens, quercetin glycosides, safrole
- **Cranberry sauce:** furan derivatives
- **Broccoli spears:** allyl isothiocyanate
- **Sweet potato:** ethyl alcohol, furfural
- **Rolls with butter:** acetaldehyde, benzene, ethyl alcohol, benzo(a)pyrene, ethyl carbamate, furan derivatives, furfural
- **Pumpkin pie:** benzo(a)pyrene, coumarin, methyl eugenol, safrole
- **Apple pie:** acetaldehyde, caffeic acid, coumarin, estragole, ethyl alcohol, methyl eugenol, quercetin glycosides, safrole
- **Coffee:** benzo(a)pyrene, benzaldehyde, benzene, benzofuran, caffeic acid, catechol, 1,2,5,6-dibenz(a)anthracene, ethyl benzene, furan, furfural, hydrogen peroxide, hydroquinone

(Source: Courtesy American Council on Science and Health, N.Y.)

Using electrochemistry to degrade environmentally harmful chlorinated organic chemicals

by Philip C. Gach* and Dennis G. Peters

Chemical history is littered with substances that were once used extensively because they possessed attributes that appeared to make them beneficial for society, but that were later found to exhibit adverse effects on humans and the environment. Notable examples are hexachlorobenzene (HCB), a fungicide banned in 1966, and pentachlorobenzene (PCB), a fire retardant and fungicide;

DDT [4,4'-(2,2,2-trichloroethane-1,1-diyl)bis(chlorobenzene)] and DDD [4,4'-(2,2-dichloroethane-1,1-diyl)bis(chlorobenzene)], both pesticides eliminated from use, as well as DDE (4,4'-(2,2-dichloroethene-1,1-diyl)bis(chlorobenzene)); and chlorofluorocarbons (CFCs) or freons, destroyers of the ozone layer that were prohibited by the Montreal Protocol passed in the late 1980s. It is well known that HCB, PCB, DDT, DDD, and DDE are carcinogenic and cause liver and reproduction problems in both humans

and animals. Moreover, all of these materials can accumulate in the environment and can remain for a long time because they are slow to degrade. Unbelievably, DDT has recently gained new notoriety because the U.S. Agency for International Development announced in 2006 that it would once again fund spraying of DDT on the inside walls of houses in Africa to prevent malaria.¹

A great deal of emphasis has been placed on establishing methods by which these hazardous substances can be dechlorinated so as to diminish their deleterious qualities. In our laboratory, we have focused on the catalytic degradation of these chlorinated organic compounds through the use of cobalt(I) salen, electrogenerated via one-electron reduction of cobalt(II) salen at carbon electrodes in dimethylformamide (DMF) containing a conducting electrolyte (tetraalkylammonium tetrafluoroborate):

One advantage of our approach is that we can effectively degrade the substrates while using voltages much less than would be required for direct reduction.

To start our work, we investigated the behavior of the cobalt(II) salen–cobalt(I) salen system by itself (Figure 1, curve A) using a technique called cyclic voltammetry — where we record a plot of current as a function of cathode potential; this curve exhibits two peaks of essentially equal size (a positive peak for reduction of cobalt(II) salen and a negative peak for oxidation of cobalt(I) salen). Then, in curve B, we show a cyclic voltammogram for a solution containing cobalt(II) salen and an excess of HCB. How do we know that cobalt(I) salen is a good catalyst for reductive degradation of HCB? It is because the positive peak for curve B is much larger (due to catalytic turnover) and the negative peak has disappeared (because cobalt(I) salen is consumed by HCB). When we looked at cyclic voltammograms for mixtures of cobalt(II) salen with PCB, DDT, DDD, DDE, and CFCs, we saw the same behavior — good evidence for catalytic reduction of these chlorinated compounds. On the other hand, we found that a solution containing a cobalt(II) salen–tetrachlorobenzene mixture is one for which there is no detectable substrate–catalyst interaction.

What products are formed when cobalt(I) salen catalytically reduces HCB? To answer this question, we carried out large-scale (bulk) electrolyses, which allowed us to separate, identify, and quantify the products by means of gas chromatography and gas chromatography–mass spectrometry. In a bulk electrolysis, the catalyst is continuously regenerated so that it has the opportunity to react with as much of the substrate as possible (and, ideally, all of the substrate). Formed from the catalytic reduction of HCB are PCB (the major product) and small quantities of the three isomers of tetrachlorobenzene. Catalytic reduction of PCB affords the three isomers of tetrachlorobenzene, along with unreacted PCB.² These product distributions depend on the catalyst–substrate concentration ratio.

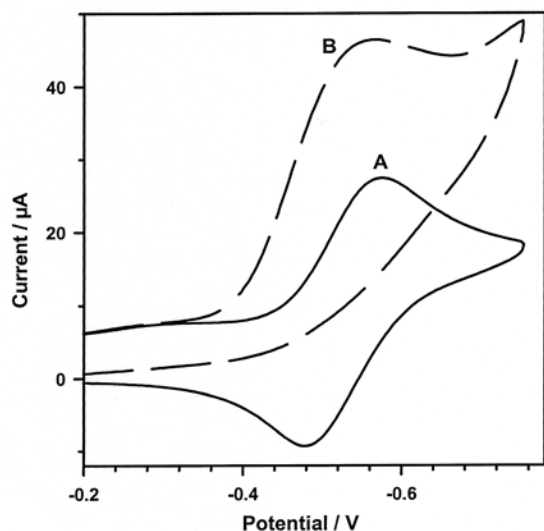
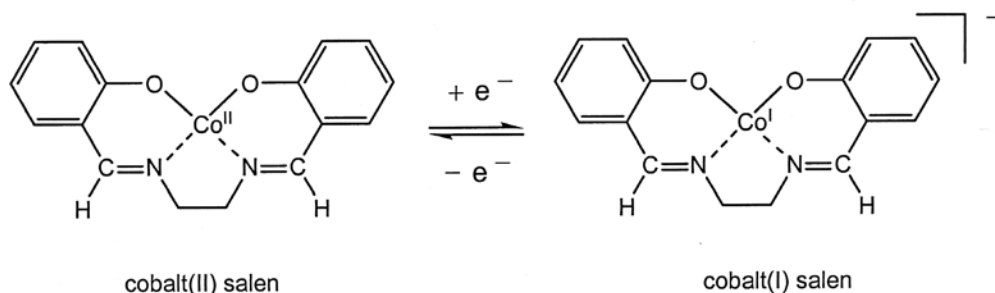


Figure 1. Cyclic voltammograms for reversible reduction of cobalt(II) salen to cobalt(I) salen (curve A, solid line) and for reduction of cobalt(II) salen in the presence of excess HCB (curve B, dashed line).



From the catalytic reduction of CFC-113a (1,1,1-trichloro-2,2,2-trifluoroethane), we obtained HCFC-123 (2,2-dichloro-1,1,1-trifluoroethane), which is the major product, and small amounts of HCFC-133a (2-chloro-1,1,1-trifluoroethane), HCFC-1122 (2-chloro-1,1-difluoroethene), HFC-1132a (1,1-difluoroethene), and unreduced CFC-113a.³ Additional research dealt with the catalytic reduction of CFC-113 (1,1,2-trichloro-1,2,2-trifluoroethane) with electrogenerated cobalt(I) salen.⁴ Bulk electrolyses of cobalt(II) salen in the presence of CFC-113 give a product distribution consisting of trifluoroethene, 1,1,1,2-tetrafluoroethane, and two difluoro compounds.

Under conditions similar to those used for the two cobalt(II) salen–CFC systems, we studied the catalytic reduction of DDT as well as two of its harmful reduction products — DDD and DDE — by electrogenerated cobalt(I) salen.⁵ For example, bulk electrolysis of a cobalt(II) salen–DDT mixture yields, in decreasing order of abundance, DDMU [4,4'-(2-chloroethane-1,1-diyl)bis(chlorobenzene)], DDNU [4,4'-(ethene-1,1-diyl)bis(chlorobenzene)], an isomer of DDNU [1-chloro-4-(2-chloro-1-phenylvinyl)benzene], DDE, DDM [bis(4-chlorophenyl)methane], DBP [bis-(4-chlorophenyl)methanone], and DDD. Additionally, catalytic reduction of DDD gives DDMU as the major product with smaller amounts of DDNU, the DDNU isomer, DDE, DBP, and some remaining DDD. Bulk catalytic reduction of DDE affords DDMU (the major product) and DDNU, with a large quantity of DDE going unreduced.

Cobalt(I) salen has been shown to be a good catalyst for degrading these environmentally harmful chlorinated organic compounds. However, there are disadvantages to the use of cobalt(I) salen; it is highly sensitive to oxygen and is oxidized to cobalt(II) salen and even to a peroxo-bridged dicobalt(III) salen species, and it appears to degrade over the time period of a prolonged electrolysis.

In another investigation in our laboratory,⁶ the catalytic reduction of CFC-113 by electrogenerated nickel(I) salen in an ionic liquid (1-butyl-3-methylimidazolium tetrafluoroborate) was successfully demonstrated with the aid of cyclic voltammetry. Ionic liquids have been highly touted as solvents for green chemistry,⁷ and we are presently planning to extend our research in this area of electrochemical catalysis.

One of the drawbacks to the use of nickel(I) salen or cobalt(I) salen is the tendency of radical intermediates derived from substrates to add across the imino (C=N) bonds of the ligand, a phenomenon that leads to loss of catalyst efficiency. Thus, we have initiated a series of studies designed to synthesize nickel- and cobalt-bearing salen-like complexes with a variety of alkyl groups on the imino bonds of the ligand. For example, electrogenerated dimethylated nickel(I) salen — with a methyl group on each imino carbon atom — has



Courtesy of Dennis Peters

been discovered to be a useful catalyst; the presence of the methyl groups shifts the reduction potential of the catalyst precursor to a more negative value, and the catalyst is less susceptible to alkylation of the ligand during bulk electrolyses. Future development of a series of modified metal complexes that are tuned to different reduction potentials and that are more resistant to alkylation should provide a library of more efficient catalysts for the reduction of environmentally harmful substances.

Finally, we are developing a flow-through electrochemical reactor (shown in the accompanying photograph) that can be employed to degrade halogenated organic compounds catalytically on a large scale. Whereas most conventional electrolytic cells permit reduction of only a small quantity of material, an efficient flow-through cell will allow for the quick catalytic degradation of a large amount of substrate.

Dennis Peters and Philip Gach in everyday lab attire

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* In August 2004, Philip Gach started research with Dennis Peters; he received a B.S. degree in biochemistry in May 2007. As an undergraduate, Gach published three papers on subjects related to this article, and he gave two oral presentations at meetings of the Electrochemical Society in Denver (May 2006) and Chicago (May 2007). Gach received the Sigma Xi (Indiana University chapter) Undergraduate Research Award in April 2007. In August 2007, he began working toward a PhD degree in analytical chemistry at the University of North Carolina at Chapel Hill.

'Chymistry' and Isaac Newton: mystical myth?

by William R. Newman, Department of History and Philosophy of Science

Most of us are familiar with the idea of alchemists as unscientific or even anti-scientific charlatans. Ever since Geoffrey Chaucer described the alchemical cheats of his blear-eyed, decrepit Canon's yeoman in the 14th-century *Canterbury Tales*, it has been popular to see alchemy as ignorant and clownish, as the embodiment of dishonest greed, or as a misguided attempt at mysticism. Despite the long popularity of this unflattering picture, however, it is now under heavy fire from historians of science. For one thing, recent historical research has revealed that alchemy, up until its death in the 18th century, was not just a deluded attempt to transmute base metals into gold. Alchemy, or as many called it, "chymistry," was a highly technological pursuit that included dye and pigment manufacture, the refining of salts, metallurgical assaying, the making of artificial gemstones, the improvement of glass and ceramic formulas, techniques for the improvement of brewing, research on incendiary weapons, the making of perfumes and cosmetics, the study and development of artificial fertilizers, and a variety of medical pursuits, such as the discovery and manufacture of entirely new pharmaceuticals as well as the analysis and purification of existing drugs, along with the more famous, if delusory, transmutation of metals. At the same time, alchemists were in the forefront of atomistic theories of matter between the 13th and 17th centuries. Long before René Descartes and Robert Boyle were popularizing the idea of a "mechanical universe" made up of corpuscles whose size, shape, and relative ordering accounted for the qualities of the world, alchemists were arguing that metals and minerals are composed of microscopic particles that could be interchanged and rearranged to produce qualitative change at the level of appearances. And it was alchemical writers of the Middle Ages who first argued that the elemental structure of matter could be revealed by chemical analysis, which merely broke unchanged bits of matter into smaller, more stable units without fundamentally altering them (see W.R. Newman, *Atoms and Alchemy*, Chicago, 2006). This was the path that Lavoisier would follow in his famous late-18th-century claim that elements are merely "the last point which analysis is capable of reaching" rather than being metaphysical entities known by philosophical reasoning.

It is in the light of this newfound respect for alchemy that we should consider the fact that Isaac Newton, brilliant mathematician and father of modern physics, spent more than 30 years engaged in a passionate pursuit of "chrysopoeia," or alchemical transmutation. But the mere fact of Newton's deep devotion to alchemy is still bound to raise an element of cognitive dissonance in the minds of many, so it is worth recounting the evidence before considering the reasons for Newton's belief. Humphrey Newton, who was his laboratory assistant for five years, gave an unforgettable picture in 1727 of a feverish and sleep-deprived Newton refusing to leave his laboratory until daybreak for weeks on end. What was the purpose of his obsessive experimentation? At first Humphrey is coy, telling us that Newton's goals were inscrutable, but at the end of his famous quotation he admits that "the transmuting of metals" was Newton's "chief design." Newton was an alchemist, and there can be no doubt of it.

But for those who refuse to be convinced by Humphrey's testimony, there still remains the ineluctable obstacle presented by the 131 or more surviving manuscripts that Newton devoted to alchemy. Many of these, admittedly, are mere transcripts made by Newton of

his reading, and one does not, of course, have to believe everything that one reads. And yet, among these manuscripts, there are two full laboratory notebooks recording Newton's experimentation from the 1660s up to 1696. The two notebooks, both kept at the Cambridge University Library, record Newton's dated alchemical experimentation alongside some of his most famous discoveries, such as the fact that white light is a mixture of distinct spectral colors rather than a homogeneous medium. This manuscript, along with many others, has been edited by the *Chymistry of Isaac Newton* project at IU, which can be consulted at www.chymistry.org. It is these notebooks that record Newton's attempts to make such alchemical products as the "Hollow Oak," the "Net," and the "Caduceus" of Mercury. With the aid of the Department of Chemistry's Cathrine Reck, a small team of historical researchers is now trying to recreate these and other products of Newton's "chymistry" in a lab at IU. Some of these products were recently featured in a Nova documentary devoted to Newton's "secrets," which featured a Web site based on the *Chymistry of Isaac Newton* project (www.pbs.org/wgbh/nova/newton/alchemy.html).

Now that we have established the fact that Newton was a serious alchemist, we are in a position to ask where he obtained his conviction that the Hermetic science held something genuine. People often wonder why scientific figures of the caliber of Robert Boyle, the so-called "father of modern chemistry," and, above all, Newton believed in the possibility of transmuting one metal into another. There are two ways to approach this question, one theoretical, the other practical. From the viewpoint of theory, it is enough to say for now that the mechanical philosophy of the 17th century, which postulated a uniform material out of which all things are composed, was quite amenable in principle to the transmutation of many if not all things into one another just as the alchemists also supposed.

But the mere theoretical possibility of one corpuscle turning into another does not alone account for the decades of hard work that Newton, for one, devoted to transmutational alchemy. For he, and others like him, were the beneficiaries of hard evidence that minerals could grow and vegetate beneath the earth as well as in a flask. Saltpeter, alum, and vitriol, for example, were all known to replenish their supply after having been collected by miners. Saltpeter underwent continual efflorescence out of basements and dry soil in the form of niter growing on walls and floors. As for alum,



And just as one can pick an apple when it is still green or wait for its sweet red fruit, so — alchemists argued — it was possible to collect the minerals of base metals such as lead or copper before they had a chance to mature into silver or gold.





Professor William Newman

it too is found to be replenished in nature, thanks to the action of sulfurous fumes in the volcanic areas called solfataras. Growth and replenishment were also known to occur with vitriols. Iron and copper vitriols, which we now call sulfates, were found adhering to the walls within mines as green or blue crystals that grew and changed with time.

In fact, it is not just unrefined minerals but pure metals themselves that appear to grow or vegetate in nature. Native silver, for example, is often found in the form of twisted stalks and branches beneath the earth. Copper too forms branching formations in its native state. All of this evidence and more convinced miners and alchemists alike that the earth was filled with life and that mineral veins were the branches of huge subterranean trees. And just as one can pick an apple when it is still green or wait for its sweet red fruit, so — alchemists argued — it was possible to collect the minerals of base metals such as lead or copper before they had a chance to mature into silver or gold.

There was further evidence that such ripening processes really were happening within the earth. The most obvious example occurred in the case of silver and lead. Even today it is a well-known fact of mineralogy that silver and lead ores are often found together. Argentiferous lead ores, as they are called, can be very rich in silver. A classic case is the mineral galena, lead sulfide, which is often bound together with argentite, or silver sulfide. Given the other facts about mineral growth and replenishment that I have adduced so far, it was not unreasonable for miners and alchemists to infer that the lead was slowly ripening into its more mature form, namely silver.

But, of course, once they are dug up, most minerals seem to be inert and dead. If one could only actuate their hidden life, then he could make them multiply and mature into their noblest form — the precious metals. This, of course, was the dream of many an alchemist, and Newton himself was clearly not immune to it. Newton, in fact, wrote a famous manuscript on vegetation, which you can now view online on the *Chymistry of Isaac Newton*

project. The manuscript, called “Of Natures obvious laws and processes in vegetation” begins with the claim that metals can be made to “vegetate,” that is, to grow, within a flask. He could have in mind any number of processes for making dendrites, but two in particular were well known in the 17th century. The first is the so-called *arbor Dianae* or “Tree of Diana.” Diana was the traditional goddess of the Moon, and the alchemists had associated the Moon with silver since late Antiquity. Hence a Tree of Diana should be a silver tree, and so it is. The Tree of Diana is a lovely metallic dendrite composed of silver and mercury, made by putting some silver-mercury amalgam in a dilute solution of silver and mercury dissolved in nitric acid. Newton also probably knew of other types contemporary metallic vegetation, such as the one that we now know as a silica garden. In Newton’s day, the garden was made by first dissolving iron in “spirit of salt,” that is, hydrochloric acid, and then boiling the solution to dryness. The reddish sediment produced by this is nowadays called iron(III) chloride. In the meantime, a material known then as “oil of sand” was made by fusing sand with salt of tartar, what we now call potassium carbonate, at a high temperature. When you do this, a white powder is formed, which dissolves into a thick, clear liquid in humid air. This “oil of sand” is the modern potassium silicate. It is a close relative of the much more common commercial “water glass,” also known as sodium silicate. When one puts his metal salt into the “oil of sand,” the salt gradually dissolves in the potassium silicate solution and the solution is immediately encased in a silicate shell. Osmotic pressure causes the shell to rupture, the salt-solution rises, and the process is repeated, forming a sort of tree. One could easily think that it displayed signs of life.

We have seen, then, that alchemists and miners had good reason to think that metals and minerals grew within the earth. Moreover, they were able to replicate this growth outside of the earth within their laboratory vessels. But there was also another piece of evidence for metallic transmutation that was much more direct than the one supplied by vegetation. For the natural world itself provided plenty of evidence of metallic transmutation to 17th-century thinkers. The fact is that metals do indeed seem to turn into one another in nature. I refer to the well-known phenomenon of vitriol springs found in mining areas such as Goslar in Germany and Schemnitz in Hungary. In these and other European mining centers, early modern observers found naturally occurring blue vitriol within the shafts, which formed springs and pools impregnated with the vitriol in a dissolved state. If one took an iron object and placed it in the pool, or better yet iron filings, a transmutation into copper quickly occurred. Hence in a 1669 letter to his friend Francis Aston, who was about to travel on the Continent, Newton asked the young voyager to confirm the transmutative power of the vitriol springs in Schemnitz. As the editors of Newton’s correspondence have determined, Newton’s question stemmed from his reading of a very prominent German alchemical writer named Michael Maier, who had written on the subject in 1617. The young Newton, who had only immersed himself in alchemy in the mid-1660s, was clearly looking for proof of metallic transmutation.

In conclusion, it is clear that Newton’s love for alchemy was not an irrational obsession even if it was in the end unrequited. But was it really so fruitless as all that? There is good evidence that Newton’s “chymistry” spilled over into his other scientific pursuits, such as his optical experimentation and his early attempt to arrive at a unified picture of the cosmos (see <http://webapp1.dlib.indiana.edu/newton/mss/intro/ALCH00081>). Although Newton did not discover the philosophers’ stone, it may well be the case that alchemy provided him with other, indirect benefits. The interested reader should keep an eye on the *Chymistry of Isaac Newton* project as further progress is made in deciphering Newton’s alchemical quest.

A vision for the present and for the future

by Michael A. McRobbie, IU's 18th president



Michael A. McRobbie

Courtesy of Indiana University

My first acquaintance with the Indiana University Department of Chemistry stretches back long before I arrived here in 1997. I was lucky enough to have had as one of my mentors at the Australian National University physical chemist Ian Ross, who was one of that university's legendary administrators. He spent productive visits working at IU with the highly distinguished Charles Parmenter. Ross's vivid descriptions of his experience raised my already high expectations regarding the quality of innovative research being conducted at IU. Since my arrival in 1997, those expectations have been exceeded again and again.

When I first joined the university, then-IU President Myles Brand asked me to create a modern IT environment throughout the university that would make IU a leader "in absolute terms for uses and applications of IT." In no small measure, that leadership has contributed to great advances in the biological and physical sciences. The first two steps in achieving that goal were to prepare the IU Information Technology Strategic Plan, which has served as a model for institutions across the nation, and to help create the School of Informatics, one of the nation's first such schools devoted to IT and its applications across many disciplines.

The powerful infrastructure that we created has provided the brilliant faculty in the Department of Chemistry, as well as other departments across the university, with the tools that allow them to concentrate on addressing increasingly complicated research questions. A glance at the recent accolades that the department has received and partnerships it has created demonstrates the outstanding caliber of the research being conducted.

For example, Mookie Baik, who specializes in computational chemistry, was awarded a 2007 NSF Early Career Development Grant to investigate the conversion of water to O_2 and H_2 . Ultimately, the basic research being conducted in Baik's lab will be crucial in helping solve the impending energy crisis. Baik's recent award reinforces the tremendous accomplishments of the department as he is IUB chemistry's third Career awardee in three years. In 2006, Dongwhan Lee was given this honor for his studies of molecular sensing, switching, and transport as supported by shape-adaptive molecules. Daniel Mindiola was honored with the Presidential Early Career Development Award in 2005 for his studies of metal-based systems that can convert atmospheric greenhouse gases into useful products. These awards demonstrate the department's successful recruitment of outstanding young faculty and recognize the first-rate research going on throughout the department.

That research reaches beyond university walls as faculty form partnerships with Hoosier commu-

nities and apply their research in ways that help save lives. For instance, Marcadia Biotech aims to develop medical drugs created in the laboratory of Richard DiMarchi. SpheroSense Technologies — founded by Bogdan Dragnea, physicist James Glazier, and doctoral student Dragos Amarie at IU's Biocomplexity Institute — will manufacture a monitor to detect early signs of sepsis or infection in the bloodstream in post-operative and trauma patients. And these are only two of the many partnerships that reach beyond the university to make a difference in the lives of the people of Indiana and of this nation.

This is also precisely what the Indiana Life Sciences Initiative aims toward. With strategic investment in life-sciences research statewide, Indiana University can make this state a national center for innovation in the life sciences, and this will make a real difference to the citizens of Indiana in jobs created, income earned, and lives saved. The IU Department of Chemistry is at the heart of this initiative.

The spirit of optimism — the desire to make the world a better place — drives research and education toward the frontiers of knowledge. Just look to the laboratories filled with tomorrow's chemists, scholars, and doctors to see this optimism. The IU Science, Technology, and Research Scholars, or STARS, program, which pairs undergraduates with faculty mentors for in-depth scientific research, provides just one example of the power of chemistry faculty and student collaboration.

Mackenzie Ford, an IU STARS student, worked in Professor Ted Widlanski's lab several years ago and just completed her MD/MA at Washington University. She will be starting her residency this fall. Ford's research at IU focused on redesigning DNA to have new biological properties. Like a molecular surgeon, she reached in and replaced the phosphorus-containing backbone of DNA with sulfur-containing linkages. The result was the creation of DNA molecules with altered biological properties that would be useful as tools for biochemical research. According to Ford, this kind of in-depth training, with mentors like Widlanski, provided the ideal preparation as she moved on to medical school. This is the kind of first-rate teaching and research for which the IU Department of Chemistry has long been known.

IU must continue to vigorously pursue our dual missions of education and research. Just as we pursue these missions, we will also strengthen our partnerships with organizations throughout the state who are as interested as we are in improving Hoosier lives. Our ultimate goal is to provide a relevant, responsive, and excellent education to the people of Indiana and beyond and to conduct research that will lead to a deeper understanding of the moral and physical universes that surround us.



Change as a constant

It is an early September morning in which I assemble this communication. We are observing the annual Bloomington ritual where students arrive and the leaves on the trees begin to fall, only to be followed in the spring by the student departure and the return of the leaves. If one was less informed, you might wonder whether there was a cause-and-effect relationship.

The new academic year has just begun and it is filled with the usual level of optimism and anxiety for students, faculty, and staff. Among our daily tasks, we are ever reminded of the bigger challenges that society confronts: global warming, energy shortage, the obesity epidemic, and the like. We seem afflicted with over-consumption or a state of being so named as "affluenza," an unsustainable addiction to economic growth. As technologists, we are left pondering our place in this dilemma, cause or effect?

Over the course of the last year, we have experienced an unprecedented degree of change in administrative leadership at Indiana University. It has been said that all change, good and bad, is stressful. Births and deaths, marriages and divorces, and new careers and retirement are changes that we readily recognize as being sources of sizable personal stress. The appointments of the new university president and the dean for the College of Arts and Sciences are two welcome additions to Indiana University. On the heels of these appointments, I decided to return full time to my role as faculty scientist, the primary purpose for which I came to IUB in 2003. My willingness to serve this last year was a direct function of my care and concern for the department at a particularly unsettled time in the leadership of the university, the College, and the department.

This past year was one of growth and productivity. I recently hosted a group of senior executives from one of the largest global pharmaceutical companies located in New Jersey. It was refreshing and encouraging to receive their compliments on the physical beauty of our facilities, the friendliness of our staff, and the accomplishments of our scientists. It was a reminder of the virtues we enjoy, a spectacular history of scientific accomplishment, a highly competent and loyal staff, and one of the most beautiful environments to conduct our affairs. The recent opening of Simon Hall enhances the physical infrastructure and deepens our commitment to scientific discovery.

We have been fortunate to attract three outstanding new faculty members to our faculty. Michael VanNieuwenhze and Zachary Aron are our first additions to the rebuilding of organic chemistry.

David Giedroc joins us as a full professor following distinguished service in physical biochemistry at Texas A&M. We remain committed to growth in all aspects of chemistry and the interdisciplinary areas associated with biology, physics, and informatics. The graduate student program remains strong with a new class of 40 students rapidly integrating into teaching and research assignments.

I thank all of you for the continued support that we have experienced throughout the last year. Alumni such as Kenneth Miller and William Carroll have been instrumental in the assembly of a lecture series that focuses on the interface of academic and applied technology. Professor David Williams deserves special recognition for his tireless work throughout this past year in the recruitment of faculty and graduate students. Amy Van Pelt and the staff in the Business Office provided continued leadership in the non-technical foundational aspects upon which this department functions. Special recognition is most deserving of John Huffman in the year of his retirement. His world-class leadership within the molecular structure center has been a strength of the department for more than three decades. These are but a few individuals who immediately come to mind among a score of others who are evident in this annual report.

Finally, let me make note of the passing this summer of three professors emeriti. Harry G. Day, Frank R.N. Gurd, and Rupert A.D. Wentworth leave us with many memories of distinguished science, inspired teaching, and outstanding service to this department. Professor Wentworth served as editor of this annual report for many years and was a source of great personal warmth throughout my recent tenure in the department. Professor Gurd was someone with whom I trained, and I will remember him most as someone of impeccable academic training who added great intellectual dignity to the department. Professor Day's long and distinguished tenure in the department quite simply set the standard for excellence in research and service. They are individually and collectively missed and will be long remembered.

In closing, let me encourage you to stay connected to this Department of Chemistry. We welcome your communications and visits. The spirit of this department is the collective body of individuals who have trained and served in it. It never ceases to amaze me how large and distinguished we have grown to be.

— Richard DiMarchi



Richard DiMarchi

Breaking news

James Reilly named chair

Days before we went to press, James Reilly accepted the chair position in chemistry. Coming to IU chemistry in 1979, Reilly has been recognized for his commitment to teaching in addition to developing a vigorous research program in analytical chemistry. Research in the Reilly group includes forming and characterizing complex biological ions more efficiently, proteomics, photochemistry of peptides, large protein characterization and cellular fingerprinting.

Around IU • Chemistry

FACULTY NOTABLE HONORS

Mu-Hyun “Mookie” Baik received an Alfred P. Sloan Research Fellow Award. This is an extraordinarily competitive award, involving nominations for the very best scientists across the United States and Canada.

In November, **David Clemmer** received the 2007 American Chemical Society–Akron Section Award. This award is given to recognize young industrial or academic scientists and to encourage their interaction with section members.

Romualdo de Souza is the recipient for the 2008 ACS Glenn T. Seaborg Award for Nuclear Chemistry. This award is to recognize and encourage research in nuclear and radiochemistry or their applications.

Gary M. Hieftje was the recipient of the 2007 Colloquium Spectroscopicum Internationale Award for distinguished achievements in research and development in spectrochemical analysis and mass spectrometry. The CSI award is sponsored by John Wiley & Sons Ltd. and was presented in September at the Colloquium Spectroscopicum Internationale XXXV in Xiamen, China.

Dongwhan Lee was the recipient of the 2006–07 IU Outstanding Junior Faculty Award. The Faculty Review Committee was challenged to choose from among applications all marked by both solid accomplishment and exceptional promise. The Outstanding Junior Faculty Awards are sponsored by the Office of Academic Affairs and the Dean of Faculties as well as the Office of the Vice Provost for Research. The awards are designed to assist untenured and tenure-track faculty to enhance their research programs. Awards are given to junior faculty members who show promise of achieving great distinction as scholars or artists.

On March 8, Charles University in Prague, Czech Republic, recognized **Milos V. Novotny** as *Doctor Honoris Causa* in the field of natural sciences during an elaborate and traditional ceremony attended by academic dignitaries from several universities, mem-

bers of the Czech Parliament, government of Czech Republic, and selected foreign guests. During the last 10 years, Charles University selected only two additional individuals for the honorary doctorate in science: Richard Ernst of ETH (Switzerland) and Thomas Cech of the University of Colorado, both Nobel laureates. Novotny was honored for his scientific achievements in bioanalytical chemistry as well as a profound pedagogical influence on the graduate students and visiting scientists from Czech Republic.

Milos V. Novotny recently received the Jan Weber Prize and Medal by the Slovak Pharmaceutical Society for his “significant research, pedagogical and organizational contributions in the field of bioanalysis.”

Dennis G. Peters has been named a fellow of the Electrochemical Society in recognition of his scientific achievement and service to the society. A special ceremony took place in October 2007 honoring him in Washington, D.C., at the annual plenary session of the Electrochemical Society’s 212th meeting. In addition, Peters was honored by the American Chemical Society for the personal milestone of achieving a half-century of membership.

Gary Wiggins, director of the program in chemical informatics and adjunct professor of informatics, has been chosen as the recipient of the 2007 Patterson-Crane Award. The biennial award consists of a monetary honorarium and personalized commendation. Presented in the spring at an awards dinner held in Columbus, Ohio, the award was given based on outstanding achievement in the field of chemical information science.

David R. Williams received the 2007 Distinguished Faculty Research Lecturer Award. This award was established to recognize the significant role of research and creative activity in the mission of the Bloomington campus.

Last spring, three Department of Chemistry faculty, **Dongwhan Lee**, **Dennis Peters**, and **Cathrine Reck**, were recognized as recipients of 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 bases for selection.

LECTURE SERIES, SPECIAL LECTURES, & SYMPOSIA



Lectures

Professor **Bruce Alberts**, Department of Biochemistry and Biophysics, University of California, San Francisco, was the invited speaker for the **Patten Foundation Lecture Series** in late 2006. Alberts delivered two talks: “The Joys of Science and How They Led Me to Science Policy” on Oct. 31 and “Spreading Science Throughout Our Nation and the World: A Challenge for Our New Century” on Nov. 2. Alberts is best known for his extensive contribution to the study of the protein complexes that allow chromosomes to be replicated, as required for a living cell to divide. He was president of the National Academy of Sciences from 1993 to 2005. He has had a prolific research career in the field of DNA replication and cell division.

Philip Coppens, SUNY Distinguished Professor and Henry M. Woodburn Chair, Department of Chemistry, State University of New York at Buffalo, presented the **Raymond Siedle Lecture** on Nov. 29, 2006. His talk, titled “X, Y, Z and Time: Introducing Time as a Fourth Dimension in the Analysis of Molecular Structure,” was well attended. Among his most prominent contributions (the Becker-Coppens theory and the now widely used Hansen-Coppens formalism), Coppens and co-workers conducted time-resolved studies of fleeting species existing on the time scales of microseconds. In parallel photocrystallographic work, he and co-workers discovered new binding modes of the NO molecule, the 1992 “molecule of the year.”

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Lectures

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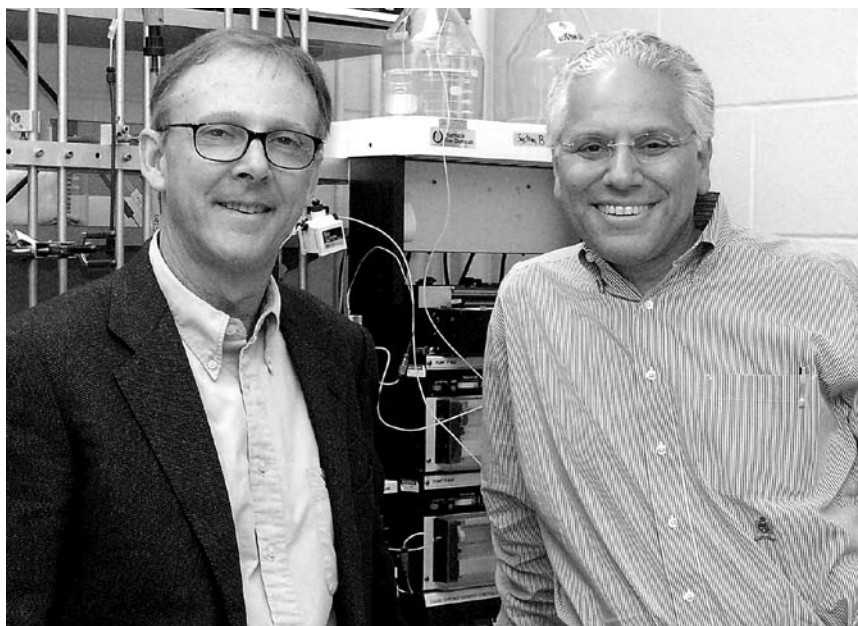
The **Harry G. Day Lecture** was delivered by **James A. Wells**, the Harry W. and Diana Hind Distinguished Professor in Pharmaceutical Sciences, Departments of Cellular & Molecular Pharmacology and Pharmaceutical Chemistry, from the University of California, San Francisco, on April 11, 2007. His talk was titled “*Caspase Signaling in Inflammation and Apoptosis*.” Wells’s research has pioneered gain-of-function protein engineering as applied to improving enzyme or hormone binding specificity/affinity, enzyme catalytic function, and protein stability. He has developed a novel site-directed approach to drug discovery and is applying this to probe protein allostery and signaling pathways.

Richard Zare, Marguerite Blake Wilbur Professor in Natural Science, Department of Chemistry, Stanford University, presented a series of talks for the **Patten Foundation Lecture Series**. Zare presented an enthusiastic demonstration extravaganza, “Chemical Fizzics: All About Bubbles,” and three talks, “Adventures in Liquid Steam Chemical Analysis and Nanoparticle Chemical Synthesis,” “Sex, Lies, and Title IX (Public Lecture on Title IX in the Academy, and Not Just Sports),” and “NASA Mission STARDUST: Catching a Comet by the Tail,” during his stay on campus Sept. 4–6, 2007. Zare is well known for his research in the area of laser chemistry, resulting in a greater understanding of chemical reactions at the molecular level. Through both experimental and theoretical studies, he has made fundamental contributions toward the understanding of molecular collision processes and contributed significantly to solving a variety of problems in chemical analysis. Zare has received numerous awards in research and teaching.

Symposia

The 16th annual Inorganic Symposium took place on Oct. 20, 2006. Speakers included **Cristina Cañada-Vilalta**, PhD’02 (with George Christou), Roche Diagnostic Corp.; Professor **William F. “Flick” Coleman**, PhD’70 (with Ward Schaap), Wellesley College; Professor **Suri Iyer**, PhD’00 (with Malcolm Chisholm), University of Cincinnati; Professor Jonathan S. Lindsey, BS’70, North Carolina State University; **Marty Visscher**, PhD’74 (with Kenneth Caulton), Cincinnati Children’s Hospital Medical Center. The symposium concluded with the customary dinner at Le Petit Café on Friday night and a well-attended picnic on Saturday at Hardin Ridge.

On April 25, 2007, our department held a **Mini-Symposium in Honor of John Huffman** to celebrate his contribution to the Department of Chemistry. Huffman “officially” retired in spring 2007 after being associated with IU for almost 50 years, most notably heading up the Molecular Structure Center in chemistry and publishing a prolific number of papers in his field. Guest



speakers included Professor Michael Hursthouse, Chemistry Department and National Crystallography Service, University of Southampton, UK, “Data, Data Everywhere, Nor Any Time to Think — Managing and Using Crystal Structure Data in a High-Throughput Chemical Crystallography Environment”; **Allen Siedle**, corporate research scientist, Science Research Laboratory, 3M Corp., St. Paul, Minn., “Metal Nanoparticle Catalysts”; Alfred Sattelberger, associate laboratory director, physical sciences, Argonne National Laboratories, Chicago, “Exploring Inorganic Chemistry with John Huffman — a Personal Reflection”; and **Christopher Peebles**, associate vice president, research and academic computing, dean for information technology, Indiana University Bloomington, “Long Ago, When Faculty Seriously Debated the Merits of Various Operating Systems: John Huffman, ACPC, and the Development of Information Technology as a Critical Element in Research at Indiana University.”

Top — Raymond Siedle Lecturer Philip Coppens, right, with Kenneth Caulton

Bottom — Harry G. Day Lecturer James A. Wells, left, with Richard DiMarchi

FACULTY PROFILE:

Martha Oakley

Herculean efforts effect curriculum change

Martha Oakley is easily the most active and dynamic person I know in Bloomington. She adds a great deal of warmth and camaraderie to the department through her contributions as a researcher, an educator, and an administrator. Martha's verve, vigor, and multifaceted nature have a great deal to do with the strengths our department boasts today.

Martha, a Georgia native, has lived on both coasts and the northern and southern regions of the nation. Martha grew up in Atlanta and carries a smooth southern hospitality with her still. From a young age, Martha excelled as a student, especially in foreign languages, history, and the sciences, and she participated actively in sports. In high school, she was on the girls' swimming and tennis teams. In 1982, Martha headed for the snowy scenes of Minnesota, attending Carleton College and graduating summa cum laude with a BA in chemistry in 1986. Again, Martha participated as a swimmer. Her interest in chemistry specifically took hold in her organic classes where she was turned on by the logic of evaluating chemical problems and chemical mechanisms. Martha was chosen as a Rhodes Scholar among 90 recipients worldwide. While at Oxford (New College), she earned a second degree, a BA in biochemistry, and developed a taste for rowing and travel.

She attended graduate school at the California Institute of Technology, working in the laboratory of Professor Peter B. Dervan. In the mid-'80s,

understanding the molecular basis for sequence specificity in protein-DNA interactions was in its infancy, and Martha enjoyed working in the interdisciplinary research area of bioorganic chemistry at a time when bioorganic chemists were moving from studying molecular recognition in model systems to taking on large macromolecular complexes. She developed her skills in the areas of organic chemistry, biophysical chemistry, and molecular biology by designing, synthesizing, and characterizing sequence-specific DNA-cleaving proteins.

After earning her PhD in 1993, she was the Helen Hay Whitney Postdoctoral Fellow at the Whitehead Institute for Biomedical Research located at MIT (1993–96), where she studied coiled-coil protein-protein interactions in the laboratory of Professor Peter S. Kim. From MIT, she accepted a faculty appointment at IU, where she found the barriers between chemistry and biology to be low and accessible, allowing her to develop strong relationships and collaborations between the departments. Martha quickly developed a strong and dynamic group, pursuing two major areas, the study of coiled-coil protein interactions and phosphatidylinositides.

One of the most common motifs for mediating protein-protein interactions, the coiled coil consists of two or more α -helices supercoiled around one another. Martha's early work at IU involved the biophysical characterization of short coiled-

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Martha Oakley

Southern Indiana Section ACS activities 2007

The Southern Indiana Section of the American Chemical Society hosted its usual yearly events, including an Earth Day event at the local high school, the National Science Olympiad, and ice cream socials to bring together our chemistry colleagues. We continue to support our undergraduates by offering an organic tutor in the chemistry department every Sunday from 7 to 10 p.m. during the academic year.

Jessica Brown received the ACS award for "Outstanding Undergraduate in Chemistry" during the Department of Chemistry's honors banquet ceremony April 27. Brown, who received a BS in biochemistry with a minor in psychology from IU in May, graduated with High Distinction and Departmental Honors. She performed undergraduate research in the lab of Professor Anne Prieto, submitting a thesis titled "The Characterization of Tyro-3 Receptor Signaling Pathways and Downstream Functions."

Brown was accepted as a deferred matriculate to the MD program at the Medical College of Wisconsin in Milwaukee for the class of 2008. In the meantime, she works as a research associate in the Prieto lab. She will be presenting a paper on her most recent research on the molecular mechanisms involving Tyro-3 and lipid rafts at the Neuroscience Conference in San Diego this fall.

This year, National Chemistry Week was organized and executed by master's in arts and teaching student **Desiree Henriksen**. Our events included a Movie Night, Come-as-your-favorite-element Day, and a well-attended open house on Oct. 20 to enhance the public's awareness of the wonderful contributions of chemistry. NCW was celebrated during Oct. 20–27 in the Chemistry Building. This year's theme was the "The Many Faces of Chemistry," emphasizing chemical careers and the many ways chemistry impacts different careers. Due to its proximity to Halloween, our Student Affiliates chapter hosted a successful "Chemistry of Harry Potter." In addition to the usual series of activities, the day concluded with the final customary "Demonstration Extravaganza," which was presented by **Garry Cooper**, **Dennis Peters**, and **Aliese Sarkissian**.

For the calendar year 2007, **Mookie Baik** was the chair, **Dongwhan Lee** was the chair-elect, **Kate Reck** was the secretary, and **Andrea Pellerito** remained as treasurer. **Kenneth Caulton** was our local section councilor, with **Dan Mindiola** as our alternate councilor.

— *Kate Reck*

Oakley

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coil dimerization domains, especially focusing on identifying the intermolecular interactions that specify a relative parallel or antiparallel alignment of these helices. In more recent years, Martha has turned her attention to understanding structure-function relationships in a group of biologically important proteins that maintaining the structure of chromosomes during cell division. Addressing this problem has involved not only biochemistry, but also mass-spectrometry, crystallography, and cell biology approaches.

Her second major research focus includes studying phosphatidylinositides, such as PIP2 and PIP3, which are key regulators for cytoskeletal dynamics, responses to hormones and growth factors, endocytosis, and programmed cell death. These lipids bind specifically to target proteins and modulate their functions through largely unknown mechanisms. Her strength in problem solving revolves around developing a multidisciplinary approach, combining techniques from biochemistry, molecular and cell biology, and organic chemistry to address these scientific problems.

Martha served as associate chair for undergraduate studies from 2003 to 2005. Under her leadership, our department redesigned the chemistry curriculum — the first major change in more than 30 years — impacting both chemistry and biochemistry majors but also all science majors on campus. Her Herculean efforts brought about a restructuring of the undergraduate office, implementing a team-teaching approach and an integration of fundamental and application-based content throughout all levels. Demonstrating her

adeptness at diplomacy, she brought the department in accordance to adopt this new curriculum, while working with other departments to insure these changes were more easily understood and embraced by the campus. Our department can boast better-prepared students, an increase in both majors and enrollments overall. It is not an overstatement to say that Martha was the fundamental thread allowing all these improvements to transpire.

After a two-year maelstrom of administration work, Martha sought to regain her research “center” by doing a sabbatical at Stanford with Professor Julie Theriot (a recent MacArthur “genius” award winner), specifically learning the cell biology and microbiology techniques her lab would need in its work with structural maintenance of chromosomes proteins.

Martha won the Student Choice Outstanding Faculty Award in 2002, and she has repeatedly been acknowledged with the Teaching Excellence Recognition Award — in 1999, 2000, and 2002. She has developed a strong research group and, uniquely, has opened her research labs to more than 20 undergraduates.

Martha’s office carries the evidence of a busy and creative mind, with stacks of papers and journals on every available surface. She demonstrates an equal exuberance in her personal life. If not at work, Martha spends time with her dogs, walking the many Indiana trails, or interacting in community events. She loves to travel and has spent time in Ireland, France, Australia, New Zealand, Alaska, and England over the last few years. Martha’s next big direction is heading up the graduate program in biochemistry.

— Kate Reck

IUB welcomes new NOBCCE chapter to Bloomington



The IU Department of Chemistry welcomes a new National Organization of Black Chemists and Chemical Engineers chapter. This student-based chapter exists to support and retain all underrepresented minority groups in the physical sciences. Professor **Daniel Mindiola** (right) is the chapter’s faculty

adviser and works in conjunction with Professor **Michael Edwards** (not pictured but deeply appreciated) and graduate student **Stella Aniagyei** (left) to establish a solid foundation for the new chapter. The induction into the organization took place in Orlando, Fla., in spring 2007.



Professor **Zachary Aron** joined our faculty in August 2007, after finishing an NRSA postdoctoral fellow at Harvard Medical School. Research in the Aron lab is focused on exploring new approaches to chemical synthesis. Utilizing natural biosynthetic pathways as both a starting point and inspiration, they are looking at new ways to build molecules and control chemical reactivity. Research areas include: the development of methods to reengineer polyketide synthase (PKS) enzymes allowing them to generate natural product analogs directly through fermentation; the creation of small molecular assembly lines that can be used to control multistep chemical synthesis in a single flask; and the development of enzyme-mimetic catalysts that combine cofactor-based organocatalysis with the versatility of transition metal complexes to access new avenues of reactivity.

As one of the notable events in his 85th year, Professor Emeritus **Edward J. Bair** has published a book titled *"Connecting the Dots to Future Electric Power"* (www.authorhouse.com). It is a discussion of solar power as an ultimate and perhaps inevitable solution of mankind's energy needs. As seen from the vantage point of the early 21st century, the feasibility and strategy of outer solar space

collection and power transmission to the ground as set forth in the last chapters is fascinating to contemplate. Many of the preceding chapters lay out facts and concepts needed for understanding future energy and electric power issues. The analyses are enlightening, and the book provides a comprehensive reference guide.

The **Caulton** group has been exploring the idea that wrapping a tridentate ligand (having what is termed a "pincer" geometry for holding a metal) around a metal in a low oxidation state can confer on the resulting molecule unusual reactivity: the ability to reduce difficult substrates like CO₂ or C—F bonds, cleave C—H bonds in arenes and even alkanes, and oxides of nitrogen, especially the normally refractory N₂O. These have been successful with a wide variety of metals, some common (iron, cobalt, or nickel) and some exotic (ruthenium osmium, rhodium, or iridium). In every case, they attempt "the impossible" in terms of breaking textbook rules of reactivity and then learn how such "outlier" molecules react.

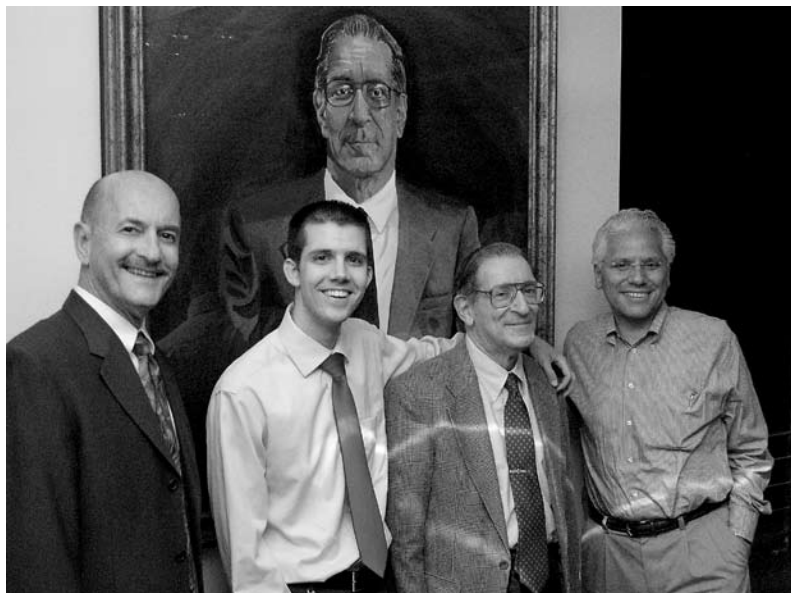
The **deSouza** group has had an exciting year! Following a couple of years of intense preparation
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Lecture hall C033 named Dennis G. Peters Lecture Hall

On a gorgeous Friday afternoon in spring 2007, chemistry lecture hall C033 was packed with people. No, not packed with students. Instead, the department gathered to offer a dedication to **Dennis G. Peters** for his contributions and unequalled dedication to this department over the last 45 years. The event included a humorous presentation from Gary Hieftje and remarks by chair Richard DiMarchi, culminating in the unveiling of a painting of Peters done by IU graduate (and Peters's student) **Brandon Sweeney**, BS'06. In his honor, chemistry lecture hall C033 will henceforth be known as the Dennis G. Peters Lecture Hall.

As anyone familiar with the chemistry department knows, Peters, the Herman T. Briscoe Professor of Chemistry, is an extraordinarily gifted teacher and the heart and soul of the IU Department of Chemistry. From winning the Ulysses G. Weatherly Award for Distinguished Teaching at Indiana University in 1969 to his most recent acquisition, a 2007 IU Board of Trustees Teaching Excellence Recognition Award, an award he has won three times previously, Peters has been recognized locally and nationally for his passion and ability to teach and his dedication to his students. Most notably, he was recognized with IU's 2006 W. George Pinnell Award for Outstanding Service in recognition for his overall service to the university.

Peters has written five textbooks, published more than 160 scientific papers, and served as the department's graduate adviser, associate chair, and director of undergraduate studies. He continues to be a mentor for the MAT degree program, a part-time undergraduate adviser. He has served as Grand Marshal for more than two decades at graduation ceremonies, has held numerous officer positions with university, state, national, and international organizations, and has performed hundreds of chemical demonstrations for the community over the years. Peters oversees the chemistry component of IU's Advanced College Project and was co-creator of I-ACT (Indiana Alliance of Chemistry Teachers) in 1987. He has graduated 29 PhD students and 12 MS students and has had 44 undergraduates work in his research labs. As evidence of his continual contributions, you can read his article on *Using Electrochemistry to Degrade Environmentally Harmful Chlorinated Organic Chemicals*, written by former undergraduate Philip Gach and Dennis Peters, in this issue of *IU•Chemistry*. Eligible for retirement several years ago, Peters is still going strong.



Professor Peters is the one who looks like the portrait. On the left is Gary Hieftje and the artist, Brandon Sweeney. On the right is Richard DiMarchi.

Faculty news

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they conducted a much-anticipated experiment in Normandy, France, to study the reaction of $^{124,136}\text{Xe} + ^{112,124}\text{Sn}$ at $E/A=50$ MeV. This experiment, which was spearheaded by the Indiana group, also involved collaborators from the United Kingdom, France, and Germany. Heading over to Grand Accelérateur National d'Ions Lourds in Caen, France, were Bloomington's James Black, Alan McIntosh, Sylvie Hudan, and Romualdo deSouza. The aim of the experiment was to study the equilibration of neutrons and protons ("isospin diffusion") in nuclear matter that provides information on the density dependence of the nuclear asymmetry energy. The experiment required measuring both charged particles and neutrons emitted in the reaction. Combining highly segmented silicon arrays together with a set of neutron detectors called DEMON provided by a French-Belgium collaboration made for a unique experiment. As usual, experimentation would not have been possible without the expert help of the technical staff in the Department of Chemistry, in particular the EIS and MIS shops. The development of MASE, our new multiplexed analog system for processing signals from highly segmented silicon detectors, was a major accomplishment for the EIS shop. We expect to be reaping the benefit of MASE for the next few years. Happily, the two-and-a-half-month visit allowed for a couple of daylong excursions to see the sights and soak in the history.

Professor **David Giedroc** joined the faculty in May 2007 following more than 18 years in the Department of Biochemistry and Biophysics at Texas A&M University. The Giedroc group is currently engaged in two major avenues of research. While very different from one another, they are united by efforts to understand nucleic acid (DNA, RNA) structure and dynamics and interactions with regulatory proteins and ribonucleoprotein machines, e.g., the ribosome, in the cell. In one project, the Giedroc group is studying a large class of specialized proteins, coined metalloregulatory or "metal sensor" proteins. These proteins control the expression of genes that allow all organisms, from bacteria to man, to quickly adapt to chronic toxicity or deprivation of both biologically essential metal ions and heavy metal pollutants found in their environments. In work highlighted by *Chemical & Engineering News* (C&EN, Dec. 11, 2006, p.12), Giedroc's laboratory recently reported the discovery of a novel copper-sensing metalloregulatory protein, termed CsoR, from the human pathogen *Mycobacterium tuberculosis*.

In a second project, the Giedroc laboratory is using the tools of biophysical chemistry and NMR spectroscopy to understand the structure and biological function of the very "tips" of the coronavirus genome, the 5' and 3' untranslated regions.

These RNA elements direct the replication and propagation of the causative agent of severe acute respiratory syndrome, the SARS coronavirus, and closely related viruses. For example, they have recently discovered a critical RNA hairpin that is essential for coronavirus viability. They are in the process of understanding the molecular-level details of how this RNA hairpin functions; these findings in turn may aid in the discovery of antiviral therapeutics that target this and related RNA motifs.

Recent activity in the **Hieftje** lab has included the development, testing, and optimization of a new source for ambient mass spectrometry. AMS is a relatively new field in mass spectrometry that is oriented toward measuring mass spectra of solid, liquid, or gaseous samples without prior sample treatment. For example, they can detect the presence of trace amounts of minimally volatile explosives adsorbed onto surfaces or present in the atmosphere. Similarly, they can determine whether a reaction vessel used for pharmaceutical products has been cleaned adequately: a polyester swab is rubbed on the surface of the vessel and placed in front of the source. If any traces of the products from the vessel remain, their spectra appear. Conveniently, the mass spectra produced by the source are relatively simple and usually consist of the molecular ion or protonated molecular ion plus some adducts if the atmosphere is fairly humid. The source is simple in design, operates in air at atmospheric pressure, requires only about 50W of power and a low flow of helium, so it is relatively inexpensive. It has already been protected by a provisional patent through IURTC.

Stephen Jacobson's group continues to develop micro- and nanofluidic platforms for chemical analysis. Over the past year, they have demonstrated the most efficient electrophoretic separations yet reported on microfluidic devices for rapid sample screening. To further improve the separation peak capacity of these systems, they are developing sample handling strategies for two-dimensional separations by evaluating serial-to-parallel and planar interfaces to efficiently transfer samples between separation techniques. To these separation devices, they plan to couple mass spectrometric analysis and have developed laser machined nozzles to electrospray the separation effluent from the microfluidic devices to a mass spectrometer. In addition to optimizing separations at the microscale, they are studying how to shrink these devices to nanometer-length scales and are evaluating the potential benefits of moving to smaller dimensions. With these nanofluidic systems, they recently reported the smallest volumes dispensed to date on a nanofluidic device, e.g., 50 aL (10^{-18} liters), with approximately 2 percent reproducibility. On similar systems, they are creating tunable filters by coupling alternating electric fields with nanoscale conduits to trap, sort, and concentrate particles and cells.

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Faculty news

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Dongwhan Lee and his research group continue to explore a new class of shape-adaptive chemical architectures that can spontaneously fold and unfold in response to external stimuli. Exploiting symmetric hydrogen bonding networks supporting a sterically congested but conformationally flexible structural platform, the group has recently created a genuine allosteric switching device that operates by addition and removal of chemical input signal. Similarly to naturally occurring multisubunit receptors displaying cooperativity (such as hemoglobin), the interdependence among multiple allosteric sites within this synthetic construct gives rise to sigmoidal fluorescence response curves in both turn-on and turn-off switching cycles. This work, along with recent advances made in his group in the areas of dynamic 2-D conjugation, was also featured in a "concept" article that he was invited to write for *Chemistry* — *A European Journal*.

The **Mindiola group** continues to seek out catalytic conversion of *N*-heterocycles present in petroleum or coal-based liquids to produce ammonia and nitrogen-free carbon-based products, a process referred to as hydrodenitrogenation. This process is an important petrochemical transformation since it reduces the emissions of NO_x upon combustion of these fuels. As a result, the reduction of *N*-heterocycles present in crude petroleum feedstock via HDN must also be performed. Unfortunately, the mechanism by which the HDN proceeds is far from being understood. In general, standard HDN conditions (2,000 psi H₂, 300–450°C) make the study of this process virtually impossible to monitor or control, and the heterogeneous nature of the catalyst prevents thorough mechanistic studies surrounding the C–N bond breaking event from being conducted at a well-defined molecular level. The current practice of HDN needs to be optimized, since robust *N*-heterocycles often carry on unharmed under the current standard conditions.

LIBRARY NEWS

Tiea Julian started as our new branch coordinator in August 2006. In her previous position, she gained a great deal of experience searching databases and finding articles for library users, so she is a real asset for the library. **Brian Winterman**, the assistant librarian, and I continue to split our time between the Chemistry Library and the Life Sciences Library.

This past year was another time to tighten the belt for our fiscal-year 2008 journal budget because our allocations do not keep up with cost increases. We had to identify more than \$41,451 in cuts. To lessen the impact on our library users, we chose to eliminate the paper copies of many of our journal subscriptions so we would not have to cancel as many titles. Beginning in January 2008, there will be only a handful of paper journals in the library. The move to a more electronic library continues in other areas too. We added a number of electronic books from Wiley that are useful to faculty preparing reading assignments for their students. A couple of examples are March's *Advanced Organic Chemistry* and *Analytical Methods in Supramolecular Chemistry*. Some other electronic resources we added this year include *Encyclopedia of Biological Chemistry* from Elsevier and the backfiles of science journals from Oxford University Press, 1878–1995.

I was involved in a team of librarians that helped develop a new Web page for the IUB Libraries. It went live just before the beginning of the fall semester. The URL for the Chemistry Library part is www.libraries.iub.edu/index.php?pageId=78. The design is simpler, and users can find services and resources categorized by faculty, graduate student, and undergraduate roles.

Lisa Johnston was our SLIS graduate assistant for the 2006–07 school year. She was a former editor at *Sky and Telescope* magazine before starting her SLIS studies. Johnston was awarded the S. Kirk Cabeen Travel Stipend to attend the Special Libraries Association annual conference held in Denver. We are pleased to hear that she recently accepted a position in the Science & Engineering Library at the University of Minnesota. She will be replaced by **Jacquelyn "Jakki" Petzold** for the 2007–08 school year. Our 2005–06 SLIS graduate student recently began her position as science reference librarian in the Blommer Science Library at Georgetown University. **Alison Rollins**, our 2004–05 SLIS graduate student, was in the National Library of Medicine yearlong training fellowship program during 2006–07.

— Roger Beckman

Graduate students **Alison R. Fout** and **Brad C. Bailey** (now a postdoctoral fellow in the MIT laboratories of Nobel Laureate Professor Richard Schrock), have discovered that a transient titanium alkylidyne (a species with a reactive Ti≡C bond) can be an excellent model for the study of HDN mechanism. This type of molecule has allowed them to quantitatively remove the nitrogen, in a recyclable manner and under mild conditions (25°C), from heterocycles such as pyridine and picolines, resulting in formation of the corresponding arene and a titanium nitrogen-based product. Applying this complex for *N*-removal of pyridines avoids the use of drastic reaction conditions, oversaturation of substrate (hydrogenation), and the use of hydrogen, all of which are common limitations in the current HDN industrial setting. If optimized reagents are used at the industrial level, the amount of energy conserved (less H₂ at lower temperature and pressure) by the petrochemical industry would be colossal.

Milos Novotny continues directing the National Center for Glycomics and Glycoproteomics (NCGG), an NIH-funded national resource center. The aims of NCGG are to apply their bioanalytical expertise in certain hypothesis-driven investigations in biomedical research; to mobilize IU's strength in bioanalytical chemistry into advancing measurements in functional glycomics and glycoproteomics; and to develop a training and educational mission in these areas. NCGG encompasses the research activities of several co-PIs and biomedical collaborators. The co-PIs include **Randy Arnold**, **David Clemmer**, **Steve Jacobson**, **Yehia Mechref**, and **James Reilly** (all in Department of Chemistry); **Haixu Tang** (School of Informatics); and several collaborators at the School of Medicine. Developing analytical methods for early detection of cancer has also been aided by a new grant from the National Cancer Institute.

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Faculty news

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Under the direction of Novotny, the Institute for Pheromone Research has been involved in cross-disciplinary studies with biologists and behavioral scientists. These studies deal with the effects of chemical signals on reproduction, prey-predator interactions in nature, and wildlife conservation issues. Novotny was recently awarded an honorary doctoral degree by Charles University in Prague and received the Jan Weber Medal of the Slovak Pharmaceutical Society.

Dennis Peters and his students continue to study of nickel(I)- and cobalt(I)-catalyzed reductions of halogenated organic compounds. Graduate student **Peng Du** is co-author of a paper (in the *Journal of the Electrochemical Society*) on the electrosynthesis of 4-methylcoumarin, via the cobalt(I) salen- and cobalt(I) salophen-catalyzed reductive intramolecular cyclizations of 2-acetylphenyl-2-chloroacetate and 2-acetylphenyl-2,2-dichloroacetate. Senior undergraduate **William Barker IV** is co-author of a paper (in the *Journal of the Electrochemical Society*) on the use of electrogenerated nickel(I) salen to effect ring-expansion reactions of some 1-haloalkyl-2-oxocycloalkanecarboxylates to afford alkyl cyclononane-5-carboxylates.

Former undergraduates **Theodore Jennermann** (a first-year medical student at Indiana University) and **Michael Ischay** (a second-year graduate student in organic chemistry at the University of Wisconsin-Madison) are co-authors of a paper (in the *European Journal of Organic Chemistry*) dealing with the nickel(I) salen-mediated reductive intramolecular cyclization of phenyl-conjugated acetylenic halides. These three papers are also co-authored by former IU graduate student **Mohammad S. Mubarak**, PhD'82, (now a professor at the University of Jordan, Amman, Jordan), who spent the summer of 2006 in the Peters research group. Recent senior **Philip Gach** (now a first-year graduate student in analytical chemistry at the University of North Carolina-Chapel Hill) will have his third publication, this one (in the *Journal of Electroanalytical Chemistry*) on the cobalt(I) salen-catalyzed electrodegradation of hexa- and pentachlorobenzene.

Thomas Tolbert's group has developed methods to produce homogeneous glycoproteins and to increase the solubility of peptides and proteins. Biochemical and structural studies of glycoproteins have long been hampered by the fact that natural systems produce glycoproteins as heterogeneous mixtures. The Tolbert lab has utilized genetically engineered yeast and *in vitro* enzymatic synthesis to produce N-linked glycoproteins homogeneously. These techniques are currently being applied to the study of glycoprotein interactions involved in antibody mediated immune responses and inflammation. The Tolbert group has also discovered a method for increasing

peptide and protein solubility. Aggregation can be a large problem in biochemical and biophysical studies of polypeptides, and it can also limit their therapeutic use. In addition, aggregation of peptides and proteins is implicated in causing cell death in neurodegenerative diseases such as Alzheimer's. The Tolbert lab discovered that addition of the small molecule betaine to the N-terminus of two bacterially expressed polypeptides dramatically increases their solubility. Both the HIV entry inhibitor peptide Fuzeon and the bacterial enzyme guanine phosphoribosyltransferase normally precipitate under mildly acidic conditions, but covalent addition of betaine to these two polypeptides largely prevents them from aggregating at pH 6.

Michael VanNieuwenhze, PhD'92, recently joined the Department of Chemistry and has established a program that utilizes organic synthesis to study problems of biological and medicinal interest. His principal focus lies in the area of antibiotics that inhibit bacterial cell wall biosynthesis. VanNieuwenhze also has research interests in the study of anticancer agents and lipid metabolites. He came to Bloomington from his previous position in the Department of Chemistry and Biochemistry at the University of California, San Diego. Prior to his appointment at UCSD, Professor VanNieuwenhze worked in discovery chemistry research division at Eli Lilly & Co., Indianapolis.

CHEMICAL INFORMATICS

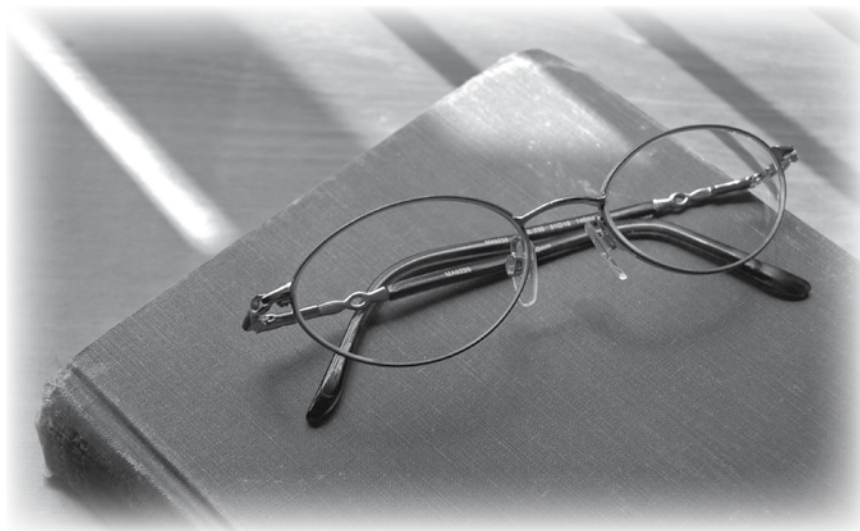
The NIH Exploratory Center for Cheminformatics Research grant has been extended for one year, enabling work to continue on the Chemical Informatics and Cyberinfrastructure Collaboratory (www.chembiogrid.org). The main work of the CICC over the last two years has been to develop a series of Web services that allow easy incorporation of cheminformatics techniques and programs into workflows and Web pages. One example is the PubDock database, which stores the results of large-scale docking calculations, including the PDB structure of the targets, 3-D structures of docked ligands, and the docking scores. **Mu-Hyun "Mookie" Baik**, **Kevin Gilbert**, **Rajarshi Guha**, **Gary Wiggins**, and **David J. Wild** have all contributed to the CICC research efforts from the School of Informatics side. Guha, a 2005 graduate from Peter Jurs's research group at Penn State, has accepted a two-year visiting appointment as an assistant professor in the School of Informatics. Guha and Wild hope to offer a workshop on cheminformatics at the 2008 BCCE in Bloomington.

There are now four PhD students and nine MS in chemical informatics students in the cheminformatics graduate programs. During the past academic year, two students finished the MLS degree in the joint Department of Chemistry-School of Library and Information Science chemical information specialist program. Meredith Saba is now the biological and agricultural sciences librarian at the University of California, Davis. Yan He is a science reference librarian at Georgetown University.

— Gary Wiggins

Closing a chapter: Gary Wiggins retires from IU

A long association with Indiana University, the IU Libraries, and the School of Informatics came to an end on Oct. 1 when Gary Wiggins retired. He was the head of the IU Chemistry Library from January 1976 through June 2003, at which time he transferred to the School of Informatics. For three years prior to that, he directed the new school's programs in bioinformatics and chemical informatics on a 0.20 FTE appointment, while also serving as coordinator of IUB's seven science libraries and head of the Chemistry Library. He administered both informatics programs until a director of the bioinformatics program was appointed in September 2006.



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Wiggins's association with the Department of Chemistry and the IU Libraries dates to 1963 when he began his studies in chemistry at IUB and also worked in the Documents Department of the old IU Main Library (now Franklin Hall). Throughout most of the 1960s, he continued to work in that position while studying for his BA in chemistry and Russian and an MA in Slavic languages and literature. Upon entering library school in 1969, he served for one year as a full-time intern in the Chemistry Library under John Knego. He was the first graduate of the School of Library and Information Science program started by Knego to train specialists in chemical information, and Wiggins himself later trained dozens of librarians and chemical information specialists in that program.

Wiggins's first professional library job was as science cataloger at IU, a position he left at the beginning of 1972 to explore a career as a Slavic librarian at the University of Illinois. Two good things happened while he was in Urbana. First, Wiggins discovered that he did not want to be a Slavic librarian, and second, he met and married his wife of 34 years, Stanislavka "Mia" Radoičić. When John Knego left Bloomington, Wiggins applied for the position of head of the Chemistry

Library and began a new chapter in his professional career in January 1976. Before the end of the decade, he and Mia had two sons, Alan and Tommy, both of whom finished their undergraduate degrees at IU. (Alan is now a postdoc in mathematics at Vanderbilt, and Tom is in his second year in the MS in the new media program at the IUPUI School of Informatics.) In 1985, Wiggins received a PhD in information science, the last of four degrees IU awarded him.

Many chemistry majors over the years took the C471: Chemical Information Sources course taught by Wiggins. The lecture notes and associated materials from that course have been converted to a Wiki format and can be viewed at http://cheminfo.informatics.indiana.edu/cicc/cis/index.php/Main_Page.

In more than a quarter of a century of managing the IU Chemistry Library, Wiggins carefully moved the services toward an electronic environment. His close associations with the American Chemical Society, particularly the Division of Chemical Information, and the Special Libraries Association Chemistry Division brought him into contact with some of the leading people in library and information science. Wiggins's contributions to those two organizations, to the IU Libraries, Indiana University, and the local community were recognized with numerous awards over the years. The IUB Libraries selected him for the William Evans Jenkins Outstanding Librarian award in 1993. He received the Herman Skolnik award of the ACS Division of Chemical Information in 1998 for outstanding contributions in the theory or practice of chemical information science. In 1999, he received the IUB Faculty Council award for distinguished service, followed in 2000 by the IU university-wide W. George Pinnell award for outstanding service to IU. The School of Library and Information Science chose him for their Distinguished Alumni Award in 2001. In 2003, he received the ACS Division of Chemical Information's Meritorious Service Award, marking the first time that a single individual had been cited by the Division of Chemical Information with both of its major awards. In 2007, he joined a select group of six people who have received both the ACS Division of Chemical Information Skolnik Award and the Patterson-Crane Award of the Columbus-Dayton Sections of the ACS. This was followed by his election to the Special Libraries Association Hall of Fame. Only 124 people have been selected for the SLA Hall of Fame since its inception in 1959.

The Wigginses intend to keep Bloomington as their home base, while visiting as much of the world as they can in the coming years. For more on the accomplishments and interests of Gary Wiggins, refer to his home page at www.indiana.edu/~cheminfo/gw/gwhome.html.

A short history of the IU Chemistry Library

The core collection of the original Chemistry Library was donated by Robert Edward Lyons around 1895. Most of those early works include his bookplates and are still in the IU Libraries. From 1895 to 1931, the Chemistry Library was housed in a room in Wylie Hall. It was moved to the ground floor of the new Chemistry Building in the early 1930s. The library was extensively remodeled and enlarged around 1965, and the present quarters were occupied during the remodeling and expansion of the Chemistry Building in the early 1990s.

The Chemistry Library has long been an early adopter of new information technology. It was the first unit on campus to have a photocopy machine and the first to have a CD-ROM player. An innovative current awareness service based on the Chemical Abstracts tapes was offered for a number of years during the 1970s, initially through the Aerospace Research Applications Center, then through the Chemical Information Center. Housed in the library, the CIC was the first place on campus, and indeed in the entire state of Indiana, to offer online searching of remote databases through the Dialog and Orbit systems. Miriam Bonham, wife of Professor Emeritus Russell A. Bonham, was the expert searcher who initially provided the service. The first director of the CIC was John M. Knego, and Gary D. Wiggins served as director for the remaining years of its existence. Another employee of the CIC was Roberta "Bobbi" Davila. A complete microfilming unit was also part of the CIC operations for many years, providing compact archival storage for laboratory notebooks and Molecular Structure Center reports. The CIC ceased operations around 1985.

In 1985, the Chemistry Library was one of the first in the world to offer the Chemical Abstracts Service Academic Program that permits low-cost searching of the CAS Online files. For 10 years, this service was provided at no cost to IUB users. CAS Online was replaced at IUB by SciFinder Scholar in the mid-1990s. Since July 2000, SciFinder Scholar has been available at all IU campuses 24 hours/day with full substructure searching. In combination with subscriptions to all of the *American Chemical Society* journal Web editions and electronic versions of many other chemistry journals (including backfiles of most of them), the SciFinder Scholar databases provide unparalleled access to the major primary and secondary sources in chemistry. Another resource that has been available to IU researchers at all campuses since its inception is the CrossFire system that includes both the *Beilstein Handbook of Organic Chemistry* and the *Gmelin Handbook of Inorganic and Organometallic Chemistry*. In 2007, the MDL DiscoveryGate system was added as an additional platform to search the CrossFire databases, Beilstein, and Gmelin. The Cam-

bridge Structural Database is also provided by the Chemistry Library, as is the Inorganic Crystal Structure Database.

Department of Chemistry secretaries oversaw the collection until the first librarian was hired in 1941. Since that date, there have been 12 heads of the Chemistry Library. Three of those served 10 years or more.

Full-time assistant heads of the Chemistry Library have been employed since 1974. In order of their service the librarians were: Margaret (Green) Ryken, Leonard A. Neubert, Miriam Dye Bonham, JoAnn Keys, and Roger Beckman. After 1998, a reorganization of the science libraries at IUB eliminated the position of assistant head. Roger Beckman became the head of the Life Sciences Library in 1999 and was given the additional duty of interim head of the Chemistry Library in 2003. When Beckman took on the responsibility as head librarian of the two libraries, he negotiated for Brian Winterman to work half time as the assistant head in both locations.

The success of the Chemistry Library in providing high-quality service to the faculty and students at IU and the citizens of the state of Indiana is largely due to the dedication of its librarians and staff. Full-time support staff members who helped to maintain the excellent level of library services over the years included Sarah Hiestand, who worked in the Chemistry Library from 1951 to 1969. Over the years, the Chemistry Library has employed a large number of capable student workers, among them, Katy, Tax, Rosie, and Greg Georgiadis, all of whom received their undergraduate chemistry degrees from IU. Since 1969, a SLIS MLS or MIS student has been assigned to work in the Chemistry Library. Most of them were in the joint Department of Chemistry/SLIS chemical information specialist master's program and went on to become influential librarians after graduation. More than 60 students have completed that program.

The reputation of the IU Chemistry Library has spread far beyond the borders of Indiana and even those of the United States. It is a great tribute to those who have worked in the Chemistry Library that this is so.

Chemistry Library heads

1941–42.....	Mary Olive Ballou
1942–43.....	Ruby L. Reavis
1943–44.....	Norma J. Johnson
1944–46.....	Jewell Maurice
1946–50.....	Carl H. Kretzschmar
1950–59.....	Albrecht M. Kronenberger
1959–62.....	Charles C. Waddington
1962–65.....	Frances Zamnik
1965.....	Victor Basile
1966–75.....	John M. Knego
1976–2003.....	Gary D. Wiggins
2003–present.....	Roger Beckman

— Gary Wiggins

John C. Huffman retires after nearly 50 years at IU

After nearly 50 years of association with the Department of Chemistry, John C. Huffman, senior scientist in chemistry, “officially” retired this year, although his colleagues know that this will not keep him from continuing to do the research he so thoroughly enjoys. Huffman is one of those unique individuals who completed his academic training at Indiana University and then decided to establish a career within the university. He has spent this time entirely within the Department of Chemistry, with the exception of the past few years when he accepted a joint appointment with the new School of Informatics to pursue his research interests in crystallographic informatics.

Huffman first arrived in Bloomington in the fall of 1959, when he enrolled as a freshman. After completing his BS in chemistry, he continued on to obtain an MS degree in physical chemistry. An elective course in geology introduced him to the beauty of crystallography, a relatively new technique that was just being introduced as research tool in the department, and he jumped at the opportunity to enter this exciting field. He completed his PhD thesis in inorganic chemistry, determining the structures of a series of highly reactive compounds using X-ray diffraction. After receiving his PhD, Huffman was named director of the newly formed Molecular Structure Center, a position he has held to this date. He developed this facility into an internationally recognized center of excellence in the area of small-molecule crystallography and through the years has earned the respect of his peers and many collaborators. Huffman has authored or co-authored nearly 800 scientific papers and has been involved with nearly 200 presentations at scientific meetings. This high level of productivity has resulted in his current ranking as the 14th most significant contributor to the Cambridge Structural Database (an international database that includes all small molecule structures determined using crystallographic techniques). The Institute of Scientific Information included Huffman as one of the charter members of the ISI Highly Cited.com database “of the world’s most cited and influential scientific authors” when it was established in 2001. He was listed as fifth most cited chemist in the world for the period 1981–97 and was the 11th most cited for all sciences.

Huffman’s interest and involvement in computing issues on campus dates back to those early days when crystallography was one of the primary uses of the central computing resources. Throughout his career, he has served on many of the university-wide policy and advisory committees that shape and define the academic computing environment, and he has assisted in the preparation of major computing infrastructure proposals for university resources that we all use and take for granted today. His interest and involvement in computing issues on campus led to his being invited to assist in the planning and organization of the new School

of Informatics. Huffman was one of the “founding faculty” and for the past few years has served an adjunct professor of informatics as well as being co-director for the Informatics Research Institute.

Because his field is highly collaborative in nature, Huffman has been a strong proponent of collaboration technologies, and most of his funded research over the past decade has dealt with developing systems to share information and provide remote access to instruments and laboratories. He led a team that developed a system that allows crystallography laboratories throughout the world to share freely the molecular structures determined in those laboratories. This new methodology is presently in use in 19 laboratories in four different countries. One of the highlights of the system is that it allows anyone with a Web browser to easily view and manipulate the molecular structures in the collection without any formal training. A popular section describing common molecules was selected by *Scientific American* as one of the top science and engineering sites in 2004. The system is widely used by both researchers and educators and averages more than 15,000 users per month. Huffman is currently working on a project that will allow Web access to complex instruments that have been “grid enabled.” A virtual laboratory environment allows a researcher to monitor and control instruments and to collaborate with colleagues at another site. This system has already been used in collaborative studies he is pursuing with researchers at the synchrotron light source at Argonne National Laboratory and with collaborators at several colleges in Indiana.

In addition to his academic pursuits in crystallography and informatics, Huffman has always been a strong proponent of informal science education. He is well known for his significant contributions to science fairs at the local and state level over the years, and he remains active in this area. Having been raised in a “scouting” family and having two sons, he also became deeply involved in the local scouting program where he emphasized science and engineering skills as well as the natural sciences. He was chair of the Youth Activities Committee of the Indiana Academy of Science for many years, during which time he helped organize and direct the state Science and Engineering Fairs.

Huffman’s university service activities have not been restricted to computing and information technology. He has willingly accepted assignments that cover nearly all aspects of university life, from participation on the Staff Council in his early career, to his valuable work as director of technical services in chemistry, to his recent service on the Faculty Affairs Committee. In recognition of his many and diverse contributions to the university and community, Huffman was awarded the Distinguished Service Award in 2006, a fitting culmination to his long, productive career at IU.

— Jack K. Crandall

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Huffman’s interest and involvement in computing issues on campus dates back to those early days when crystallography was one of the primary uses of the central computing resources.
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Shawn Adrian has been hired as the undergraduate adviser in the Undergraduate Office (replacing **Alice Dobie-Galuska**). Adrian graduated from Western Michigan University with an MA in history in 2006, then came to Indiana University and worked in the Office of Student Financial Assistance, providing students with guidance and counseling through the financial aid process.

James Clark has been hired as the undergraduate laboratory coordinator (replacing Kimberly Arnold). Clark majored in chemistry and secondary education and obtained his BS from Ball State University in 2003. He worked at Chromatech for two years, then taught science courses at Wes-Del Middle/High School in Gaston, Ind., and at Edgewood High School in Ellettsville, Ind.

Aliese Sarkissian has been hired as a lecture demo technician in the undergraduate laboratories (replacing **Dan Sutton**). Sarkissian earned her BA in biochemistry from DePauw University and her MS in biology from IUPUI. She has worked in the laboratories of Hilary Eppley and Jim Mills at DePauw University.

Garry Cooper has been hired as the second lecture demo technician in the undergraduate laboratories (working the evening shift). Cooper is one of our own earning his BA in biochemistry and a BS in mathematics from IU, graduating in May 2007.

Dalane Anderson has been hired as the admissions services coordinator in the graduate office (replacing **Melissa Jayne**). She has more than nine years' experience as an administrative assistant at Young Trucking Inc. She is also a board member for the Bloomington North Band.

Margaret Jensen has been hired as an administrative secretary (replacing **Katie O'Keefe**) to Peter Ortoleva. Jensen moved to Bloomington from Ann Arbor, Mich., with her husband who is attending IU School of Law. She has a BA in anthropology and an MS in historic administration. Her job experiences include administrative support to the registrar at Monroe County Community College, an instructor in the Writing Center at Eastern Michigan University, and officer manager at Orion International in Ann Arbor.

Erin McLaughlin has been hired as an administrative secretary (replacing **Nancy Collier**) for Ted Widlanski, Mike Van Nieuwenhze, Srini Iyengar, Krishnan Raghavachari, and Charles Parmenter. She earned a BA in sociology and telecommunications in 2006. She moved to Bloomington from Louisville, Ky., where she worked as a claims submission specialist for Humana Inc.

Amy Dowell has been hired as an administrative secretary (replacing **Eleanor Porche**) for Milos Novotny. Dowell has a BA in peace and global studies from Earlham College and an MA in conflict analysis and resolution from Nova Southeastern University. She was the executive director for the Community Justice and Mediation Center in Bloomington from July 2001 to April 2007.

Emily Vincent was hired as an administrative secretary (replacing **Kaycia Myers**) for David Clemmer, Lane Baker, Stephen Jacobson, and Dennis Peters. Vincent received a BA from Kenyon College in Gambier, Ohio, and later earned her master's degree in history and public history at the University of Massachusetts in Amherst.

Derek Piper has been hired as the informatics specialist in the Molecular Structure Center (replacing **John Bollinger**). Piper transferred from the Informatics Research Institute, School of

Informatics at IU. He has a BS (honors) in software engineering from DeMontfort University, Leicester, England. He has extensive experience in professional system administration and in programming in a variety of languages.

Craig Hollars has been hired as a lab technician in the bioanalytical laboratory in the Institute for Pheromone Research for Milos Novotny (replacing **Michael Wigen**). Hollars has a BS in chemistry from IU. His experiences include working as a researcher at the IU Cyclotron and as coordinator for the 2000–01 Science Olympiad.

Cheryl Johnson was hired as the personnel and grants manager (replacing **Judy Crandall**) in the Chemistry Business Office. Johnson has worked for IU for 25 years. Her prior IU appointments include a grant specialist in Sponsored Research Services, a research secretary in the Department of Chemistry, and an online cataloger at the Wells Library. She has a BS in education (secondary mathematics) from IU.

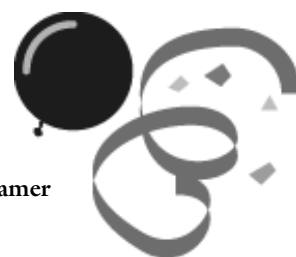
Brandon Schmitt was hired as a lab technician (replacing **Mohammad Al Bataineh**) in Milos Novotny's lab. Schmitt has a joint master of public affairs/master of science in environmental science from the School of Public and Environmental Affairs at IU. He has extensive experience working in the forest ecology lab at SPEA; as a Public Service Corps fellow for the Community Family Resources Department; Safe and Civil City Program in Bloomington; and as a graduate research assistant for Joshua Smith at IUPUI in the School of Education.

On May 1, our staff and faculty gathered at the Tudor Room in the Indiana Memorial Union for our annual staff banquet to honor some of our outstanding staff who were acknowledged for their dedication and longevity to the university/department. This year, the Outstanding Staff Award was given to two staff members, and we celebrated those award recipients and welcomed the many retired staff members who helped make this a festive event.

— Cheryl Johnson

Service recognition

- 10 years — **Angela Hansen**
- 15 years — **Lee Ann Mobley**
- 20 years — **Andy Alexander**
- 25 years — **Sarah Collins** and **John Cramer**
- 30 years — **Robin Nordstrom**



Staff Award recipients

- **Eleanor Porche**, administrative secretary
- **Jeannette Silvers**, administrative secretary

Retired

- **Judy Crandall** (Nov. 30, 2006) personnel and grants manager
- **Ray Sporleder** (May 31, 2007) research computer systems manager

Leaving the department

Kaycia Myers, administrative secretary; **Nancy Collier**, administrative secretary; **Melissa Jayne**, office services assistant, graduate office; **Alice Dobie-Galuska**, coordinator of undergraduate services and chemistry adviser; **Eleanor Porche**, administrative secretary; **Daniel Sutton**, lecture demo technician; **Robin Canfield**, scheduling supervisor

STAFF PROFILE:

Mechanical Instrument Services

Manufacturing solutions to problems

The departmental research infrastructure is a blessing that none of us could live without. Synthetic chemists rely on the NMR facilities. Inorganic chemists and biochemists make heavy use of the molecular structure center (X-ray crystallography). The departmental mass-spectrometry center has users from many areas. Most of us depend on the information technology group for help and rescue with our computer needs. The analog and digital electronics groups are central to our instrument design and maintenance needs.

Ask an analytical or experimental physical chemistry student about which of the research facilities they use most, and the answer will probably be Mechanical Instrument Services. Ask their faculty mentors where they first went when setting up their new research labs and you will get the same answer. They all find that trips to MIS are rewarding because the shop has the equipment and the personnel (never enough) and the know-how (plenty of that) to solve problems and make sophisticated products.

The special instrumentation built by MIS is ubiquitous in our department. Some has even moved far away. Professor Romualdo de Souza, for example, has an MIS particle detector array temporarily on duty with his experiment at an accelerator in Caen, France. In similar fashion, Professor Victor Viola had a rather famous and intricate MIS-built particle detector traveling to accelerators around the world. In fact, part of it is still in use

at Texas A&M. But back in Bloomington, MIS mass spectrometers of unique designs can be found in at least five labs. Several other labs have complicated molecular beam chambers constructed by MIS, each being a special design far from anything available commercially. All involve welding of aluminum or stainless-steel vacuum-tight chambers, a special capability of MIS in which John Cramer and Bruce Frye are well experienced. Smaller support items from MIS are everywhere in our labs.

As you can see from the plaque (*see left*) next to the shop door, Professor Emeritus Ed Bair has been a guiding hand behind the shop for more than 50 years. It has grown from two people with a milling machine and a lathe (both war surplus) to a group of eight instrument machinists surrounded with high-tech computer-controlled machines. Gary Fleener, who runs the operation, acquired his skills during 20-plus years of shop service since being induced by the now-retired shop head John Dorsett to move from another part of IU and learn a new trade. Delbert Allgood followed the same path from building services long ago. Fleener has continued this tradition of home-grown new hires, and the most recent convert, Doug Garvin, had only to walk a few yards from his earlier job in the Department of Chemistry receiving to join MIS. Since vacuum pump reconstruction is among his new skills, he is well known even to organic graduate students.

The shop still occupies its fundamental position in large basement rooms filled with large machines. If you haven't been there for a few years, it is worth a special trip, as the saying goes. A walk-about will reveal only a few familiar sights, most notably the lathes. On the other hand, the mill-

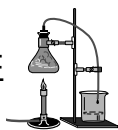
ing machines have grown to change the landscape. They number seven and are now all computer controlled. Three are two-axis machines (x,y), three are three-axis(x,y,z), and one

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Mechanical Instrument Services staff are, from left, Doug Garvin, Ed Bair, Delbert Allgood, John Cramer, Gary Fleener, Bruce Frye, and Jeremy Boshears.

GRADUATE NOTES



During the 2006–07 academic year, professors **Martin Stone** and **Daniel Mindiola** were co-directors of graduate studies. Serving with them on the Standards Committee were professors **Kenneth G. Caulton**, **Gary M. Hieftje**, **Martin Jarrold**, **Charles S. Parmenter**, and **David Williams**.

David Williams chaired the Graduate Admissions Committee. Evaluating the hundreds of dossiers submitted to the department were professors **Bogdan Dragnea**, **Amar Flood**, **Stephen Jacobson**, **Daniel J. Mindiola**, and **Thomas Tolbert**.

Fellowship award winners

Stella Aniagyei was awarded the Richard Slagle Fellowship. Aniagyei joined the lab of Professor Bogdan Dragnea in fall 2003 after receiving her BS in chemistry from Bates College. While at Bates, her research focused on synthesizing and characterizing soluble derivatives of β -cyclodextrin, a torus-shaped compound with seven glucose units, in order to enhance nuclear magnetic resonance studies of inclusion complex formation. Her research in



Stella Aniagyei

Graduate Office

the Dragnea group centers on understanding the mechanism of virus assembly from the constituent protein subunits using virus-like particles. VLPs are viruses in which the RNA core is removed and replaced with a nanoparticle. Currently, her work investigates the importance of the role of the nanoparticle scaffold in assembly as compared with protein-protein interactions via synthesis, characterization, and elucidation of the VLP structures. A promising application of these VLPs is as building blocks for novel three-dimensional optical metamaterials.

Leigh Boerner was awarded the Chester Davis Inorganic Fellowship. Boerner completed her undergraduate studies at Indiana University, earning a BS in biology and a BA in chemistry in December 2003. She decided to pursue her graduate degree at IU and joined the lab of Professor Jeffrey Zaleski in January 2004. The project that Boerner is currently working on involves the synthesis and Bergman Cyclization of porphyrinic enediynes, which can be used as photo-therapeutic agents for hypoxic environments.

Chris DuFort was awarded the William M. LeSeur Fellowship (Lubrizol). DuFort graduated from Western Washington University with his BS in chemistry in 2004. In that same year, he moved to Bloomington to begin his PhD degree at IU, pursuing research in the laboratory of Professor Bogdan Dragnea. His current research focuses on developing virus-like particle-inspired metamaterials and determining the rules through which control over their optical properties can be achieved.

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Staff profile

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is a four-axis machine. (Query: what is the fourth dimension? Answer: time.) One of the lathes is now also a big machine, computer controlled and hardly recognizable relative to its manual counterparts. Fairly new to the shop but built in 1994 is a pseudo-milling machine called a wire-EDM, the acronym for electric discharge machine. It has exotic capabilities and an exotic technology. Operating under water with a plasma from a fine wire, it can cut intricate shapes such as one might find in parts for a mass-spectrometer ion lens. Computer controlled? Of course. If professors still wore suit jackets, they could display a tiny, exquisitely shaped, IU lapel pin made for practice on the wire-EDM by Jeremy Boshears, an expert on its operation.

The machines that give MIS such high capabilities are expensive, and one wonders where the money came from. Funding for big commercial research instruments is often obtained by faculty proposals to federal granting agencies, but that avenue is rarely open for MIS tools. The state, however, has a 21st-Century Fund to encourage economic development, and a proposal by IU and Purdue analytical chemists produced funds for the high-tech shop equipment needed to produce advanced instrumentation. Other equipment such as the wire-EDM has

been bought used (sometimes almost terminally ill) with funds carefully accumulated from the modest shop charges.

MIS personnel are not ordinary machinists who work from finished drawings. Instead, they often begin with concepts only sketched out by faculty or students. Their task then becomes one of turning concepts into reality. They truly earn their title of research machinist. The process often requires CAD (computer-aided drafting) drawings and CAM (computer-aided machining) setups. Brian Ferguson and Richard Moore are especially well experienced with this software.

A unique part of the MIS job is educational. Graduate students pick up skills taught by MIS personnel and put them to good use in support of their own research. They do this with the teaching of Delbert Allgood in a student shop that is better equipped than the main shops of many chemistry departments. MIS also directly supports equipment in our undergraduate teaching labs. Recently, for example, an atomic absorption apparatus was rebuilt by MIS.

With these multiple facets to its operations, the designation “Mechanical Instrument Services” is perhaps a bit conservative. MIS provides instruments and instrument support that lie at the center of analytical and physical chemistry research programs.

— Charlie Parmenter

Graduate notes

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Department award winners

At the Chemistry Honors Banquet in April 2007, the following students were honored with awards:

E. Campaign C500 Award: **Richard Lord**

Eli Lilly Analytical Award: **Samuel Merenbloom**

Wendell P. Metzner Memorial Award: **Jay Srinivasan**

William H. Nebergall Memorial Award: **Xuan Jiang**

Felix Haurowitz Award: **Michelle Kovarik**

William Klinkenberg Award: **Yogita Mantri**

Henry R. Mahler Award: **Yinyin Li**

McKenzie Award: **Pilsoo Kang**

Jack K. Crandall Award: **Martin Walsh**

David A. Rothrock Award: **Isaiah Sumner**

Instructor Awards: **Nicholas Chow, Matthew Foley, Jonathan Meyers, Michael Webb, and Soca Wibowo**

Glen Ferguson was awarded the Kraft Fellowship. Ferguson's career in higher education began with five years in the U.S. Navy aboard an aircraft carrier. After being honorably discharged, he enrolled at the University of Southern Indiana and studied biology for two years before transferring to Marist College in Poughkeepsie, N.Y. At Marist, he completed a BS in biology and chemistry, graduating magna cum laude. Currently, Ferguson is a PhD candidate at IU working with Professor Krishnan Raghavachari. In the last few

years, they have worked on a number of exciting projects focusing on the reactivity of silicon surfaces and the vibrations of infinitely periodic systems modeled using small clusters, and they plan to develop new methods to model the X-ray photoelectron spectra using electronic structure theory. The reactivity studies have concentrated on the patterning of bare silicon surface as well as radical chain reactions at defect sites on hydrogen terminated

silicon surfaces. In collaboration with Yves Chabal at Rutgers, their work in on-surface vibrations has determined a new technique for determining infinite vibrations and assigned a formerly unknown peak in surface vibrational spectra.

Uriah Kilgore was awarded the Baxter Pharmaceutical Fellowship. Kilgore received his BS in chemistry at Southeast Missouri State University in 2004. As an undergraduate at Southeast Missouri State, he conducted research involving the synthesis of organic non-linear optical materials. Additionally, Kilgore participated in summer research programs at the University of Alabama under the guidance of Professor Anthony Arduengo III and at IU with Professor Daniel Mindiola. Returning to IU in the fall 2004, Kilgore began graduate studies with Mindiola. His current research involves the synthesis and reactivity of early transition-metal pincer complexes with special focus on the activation of small molecules by low-valent early metal fragments and construction of metal-ligand multiple bonds.

J. Cullen Klein was awarded the Chester Davis Organic Fellowship. Klein graduated cum laude with his BS in chemistry and mathematics from Ohio State University in 2002. In the same year,

he moved to IU to pursue his PhD in synthetic organic chemistry under the supervision of Professor David R. Williams. Klein is currently investigating the use of highly diastereoselective Ireland-Claisen rearrangements and intramolecular Diels-Alder reactions leading toward the total synthesis of australifungin, a potent antifungal polyketide natural product.

Tillmann Koepke was awarded the Chester Davis Inorganic Fellowship. Koepke began his chemistry studies at the Albert-Ludwigs-University Freiburg, Germany. After completion of his bachelor equivalent, he visited IU as an exchange student for one academic year and transferred to the chemistry graduate program at IU in 2004 to work under the supervision of Professor Jeffrey Zaleski. His major research interest is focused on the synthesis of novel periphery modified porphyrinic molecules and their photochemical properties for potential use as in situ alkylating reagents for phototherapeutic applications within hypoxic environments. Koepke worked as a laboratory technician with Pfizer Freiburg in Germany for three years and was the recipient of the 2006 William H. Nebergall Memorial Award.

Michelle Kovarik was awarded the National Science Foundation graduate research fellowship (2004–08). She graduated with a BS in chemistry from St. Louis University in 2004. She started her graduate studies at IU in August 2004 in the laboratory of Professor Stephen Jacobson. Kovarik has been working to fabricate nanometer-scale channels and pores using electron beam lithography and standard photolithography for use in chemical analysis.

Richard Lord was awarded the Merck Fellowship. He received his BS in chemistry and mathematics from the University of Southern Indiana in 2005. As an undergraduate, he worked on research projects ranging from Ni-based polymerization catalysts to Cr-based CO₂ activation catalysts before finding his niche in computational chemistry. Since fall 2005,

Lord has been working toward a PhD in physical inorganic chemistry with Professor Mu-Hyun Baik, studying spin-crossover coupled redox phenomena. Correctly predicting the relative energies of the spin surfaces has proved extremely challenging for current computational methods, and Lord is working on developing a protocol to accurately predict the thermodynamics of these electron-transfer reactions. Simultaneously, he is investigating the sluggish electron transfer kinetics of these redox couples using variable-temperature electrochemistry.



Richard Lord

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Graduate notes

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Samuel Merenbloom was awarded the ACS Fellowship. Merenbloom received his BS in chemistry from the University of Maryland, Baltimore County, in 2004. His current research with Professor David E. Clemmer focuses on multi-dimensional ion mobility spectrometry coupled to time-of-flight mass spectrometry. His research interests include enhancing the peak capacity and throughput of IMS-IMS separations; using IMS-IMS to probe the structures of proteins in the gas phase, and coupling desorption electrospray ionization to IMS-IMS. The main focus of his research is the construction of a circular drift tube for high resolution (~ 1000 or greater, where $R = t/\Delta t$ for IMS separations) IMS analyses. Glaxo SmithKline is funding his research.

Beili Quan received the Linda and Jack Gill Fellowship. Quan graduated from Fudan University, Shanghai, P.R. China, with a BS in chemistry. She entered IUB majoring in biological science in fall 2003. She currently works for Professor Richard DiMarchi in the research of Insulin Analogs activity. Quan participated in the American Peptide Society meeting in June 2005 and was chosen to give an oral presentation in the Young Investigators' Mini Symposium, winning the travel award for the meeting.

Justin Riddle was awarded the Baxter Pharmaceutical Fellowship. Riddle received his BS degree from University of Minnesota-Twin Cities. As an undergraduate student, he worked in the lab of Professor George Barany and spent some time in the labs at 3M Co. in St. Paul. Riddle started pursuing his PhD in fall 2003 under Professor Dongwhan Lee and is currently investigating a novel fluorescent receptor that utilizes a unique energy transfer scheme for enhanced analyte detection. Riddle also studied supramolecular aggregates with enhanced fluorescent emission upon aggregation and shape adaptive biconcave structures with unique crystal-to-crystal transformations.

Martin Walsh was awarded the Chester Davis Organic Fellowship. Walsh, a native of Louisville, Ky., graduated in 2003 from the University of



Martin Walsh

Louisville with a BS in chemistry, cum laude. The following fall, he entered IU as a graduate student in organic chemistry and joined the research group of Professor David R. Williams. Currently, he is a fourth-year PhD candidate and is working toward the

total synthesis of 4-hydroxydictyolactone, a marine diterpene that possesses both interesting structural features and promising biological activity.

Xiaofan Yang has been awarded the Kratz Fellowship. Yang received his BS from Peking University in China, where he majored in chemistry and minored in computer science. He was interested in linking lanthanides and transition metals to make heterometallic compounds. In fall 2003, he moved to IU as a joint student with both professors Kenneth Caulton and Mu-Hyun Baik. His current research is focused on the rational catalyst design from both theoretical and experimental aspects, such as the mechanistic study of water oxidation catalysts and the synthesis of new metal-carbene complexes.

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. GAANN fellowships were awarded in spring 2007 to: **Matthew Foley**, **Allison Kukuch**, **Joshua Maze**, **Kristy McNitt**, **Elizabeth Opsitnick**, **Joseph Pinchman**, **Emma Shansky**, and **Nichole Stewart**.

Other fellowship recipients were **Chao Chen** (McCormick Science Fellowship), **Yinglong Miao**, **Kun Qu** (Oak Ridge Fellowship), **Michelle Kovarik** (Women in Science), **Maggie Lerch** (Women in Science), **Anne Starace** (Women in Science), and **Jay Srinivasan** (Lilly Organic Fellowship).

Research and University Graduate School Fellowships were awarded to: **Bruce Atwater**, **Randall Binder**, **Sean Bird**, **Brian Bohrer**, **David Burgan**, **Rui Chen**, **Glen Ferguson**, **Matthew Foley**, **Robert Hansen**, **Michelle Hoffman**, **Ekram Hossain**, **James Kareth**, **Uriah Kilgore**, **Anna Kinsella**, **Tillmann Koepke**, **Michelle Kovarik**, **Margaret Lerch**, **Richard Lord**, **Nicholas Mayhall**, **Joshua Maze**, **Kristy McNitt**, **Samuel Merenbloom**, **Jonathan Meyers**, **Justin Orlando**, **James Patterson**, **Joseph Pinchman**, **David Rothgeb**, **Aulaire Schmitz**, **Andrew Share**, **Anne Starace**, **Isaiah Sumner**, **Timothy Andrew Turner**, and **Edward Witlicki**.

— Toni Lady

PhD degrees awarded

Bailey, Brad (inorganic, Mindiola, June 2007), postdoc, Massachusetts Institute of Technology, Cambridge, Mass.

Chan, George (analytical, Hieftje, May 2007), postdoc, IU Department of Chemistry

Fontus, Max (physical, Ortoleva, June 2007)

Lee, Joo-Ho (inorganic, Caulton, October 2007), postdoc, University of Southern California, Los Angeles

Shamim, Khalida (organic, Williams, December 2006)

Sowell, Rena (analytical, Clemmer, June 2007), postdoc, University of Kentucky, Lexington

Webb, Michael (analytical, Hieftje, July 2007), postdoc, Tufts University, Medford, Mass.

MS degrees awarded

Donnell, Andrew (organic, Williams, April 2007), scientist I, Wyeth Research

Lindberg, Thomas (organic, Lee, April 2007)

Peters, Nickie (physical, de Souza, November 2006)

Pitcock, William (organic, Baik, July 2007)

Sharon, Laura (analytical, Reilly, June 2007), staff chemist, West Point, Pa.

Stowell, Cheri (biological, Widlanski, November 2006)

Wright, Lisa (analytical, Hieftje, December 2006), scientist, Merck Laboratory

IUAlumniCareers.com

A wealth of resources helps IU alumni develop and manage their careers at **IUAlumniCareers.com**, the IUAA's online career and mentoring center. Alumni may register to search for jobs, post their résumés for review by employers, or search for alumni mentors for career advice. Alumni are also invited to register as mentors to give career advice to their fellow alumni.

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UNDERGRADUATE



NOTES

The academic year 2006–07 was yet another demonstration that the entropy of the universe is ever increasing. As our new curricular changes started to settle, the chemistry undergraduate office saw great changes in personnel.

All incoming science majors now pursue our 1:2:1 curriculum, and the numbers following this sequence have continued to increase. To remind our readers, a 1:2:1 curriculum means that students pursue the following sequence in their first two years: C117 Fundamentals of Chemistry and Biochemistry, C341 Organic Chemistry I, and C342 Organic Chemistry II, culminating in N330 Intermediate Inorganic Chemistry.

Although always in a state of flux, the chemistry undergraduate office has yet again seen vast changes in personnel, and these changes have brought about a new, dynamic group of individuals expressing new ideas and new energy to invigorate our office even more than ever. Most notably, **Alice Dobie-Galuska** left IU after 12 years to spend more time with her family and advise half time for University Division. Dobie-Galuska started at IU as the laboratory technician in 1993 and became our chemistry undergraduate adviser in 2003. The last four years she spent as our adviser, she provided a warm generosity to our office, and the students always appreciated her sincere and guiding help.

Dobie-Galuska left our office at the end of May to spend more time with her family, and we send the best of luck to her in her new trajectory in life. It's often only in someone's absence that we really start to comprehend all that they contribute, and it's astounding how much she did for this department.

In July, **Shawn Adrian** was hired as the new chemistry undergraduate adviser, transferring to our department from the Office of Student Financial Assistance. He brings with him a great deal of experience working with students and an exuberant personality, setting him up to be an excellent adviser. Adrian graduated from Saginaw Valley State University with a BA in history and later from Western Michigan University with an MA in history in 2006. Weeks into the position, he already knows dozens of majors by name.

In July, **Norman Dean** became our director of undergraduate laboratories, holding the position of academic specialist. As an academic specialist, Dean will oversee the laboratories and additionally contribute as teaching faculty. He begins the fall by teaching the lab component of N330 Intermediate Inorganic Chemistry laboratory. Dean earned his BS in chemistry at the University of Michigan and his PhD in inorganic chemistry, minoring in physical chemistry, from Indiana University in 1994 with George Christou. Dean comes to us from California State University at Northridge, where he held a faculty position and obtained a great deal of laboratory experience. In a few short months, he has reorganized the labs, revamped our equipment, and added a great deal of innovations to the way the labs run.

Kim Aumann, coordinator of undergraduate laboratories, had an exceptionally exciting year. She married chemistry colleague Randy Arnold, Proteomics R&D facility manager, and they an-

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Marsha Winton

Simon Hall, a multidisciplinary science building, was dedicated on Oct. 16. On the outside, Simon Hall is finished and wearing its new clothes. The inside is filling with chemists and biologists.

The fall 2007 semester saw still larger enrollments that kept us overflowing at the brim. We have record numbers of students taking C103 Preparatory Chemistry (408 students), C117 Fundamentals of Chemistry and Biochemistry (560 students), and S117 Honors Fundamentals of Chemistry and Biochemistry (68 students). Our new 1:2:1 curriculum has been in full swing for two years now, and we had our first group of science majors take N330 Intermediate Inorganic Chemistry in the spring 2007. With minor grumblings, students taking N330 admitted they were challenged, but we believe they promise to be the best-prepared students will we graduate in 2009!

The number of students majoring in chemistry or biochemistry continues to increase. In spring 2007, we had 131 students pursuing BA degrees in chemistry, 81 pursuing BS degrees in chemistry, 48 pursuing BA degrees in biochemistry, and 131 pursuing BS degrees in biochemistry. In May 2007, a total of 105 students earned baccalaureate degrees.

Undergraduate notes

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nounced their first child, Rebekah Sue, on Aug. 9, 2007. Aumann left our department in July to prepare for the new addition to the family, but she returned as an instructor for C103 this fall. She will remain connected with this department as an instructor in the coming semesters.

Quick on Aumann's heels, **James Clark** was hired as the coordinator of undergraduate laboratories in July. Clark majored in chemistry and secondary education, obtaining a BS from Ball State University in 2003. He worked at Chromatech (supplier of colorants, dyes, and pigments) for two years, taught science courses at Wes-Del Middle/High School in Gaston, Ind., and at Edgewood High School in Ellettsville, Ind. In addition to working alongside Dean, Clark oversees the outreach activities in the department.

Aliese Sarkissian was hired as a lecture demonstration technician in the undergraduate laboratories (replacing **Dan Sutton**, who left IU to take a position at Purdue as a research scientist). Sarkissian earned a BA in biochemistry from DePauw University and an MS in biology from IUPUI. She has worked in the laboratories of Hilary Eppley and Jim Mills at DePauw University. Sarkissian works well with the public during outreach activities as her enthusiastic personality adds excitement to every event.

We were fortunate to obtain a second lecture demonstration technician starting this year, one who is responsible for overseeing the night laboratory sections we offer. **Garry Cooper** graduated from IU in May 2007 with a BA in biochemistry and a BS in mathematics. He intends to obtain some practical work experience before applying to medical school in the near future.

Our scheduling officer, **Robin Canfield**, left our department in late August to take a position in SPEA. Luckily, **Becky Wilson** from the chemistry business office accepted the position and started working in the undergraduate office in October. The business office's loss is our gain!

Kate Reck became the director of undergraduate studies in July. She says, "I hope to be able to fill even one of Dennis Peters's shoes."

On Saturday, May 5, we had an excellent turnout and excellent weather for our fourth annual celebration to honor the chemistry undergraduates who graduated in December 2006, May 2007, and August 2007. Graduating seniors, their family and friends, chemistry faculty and staff — a group totaling 54 — gathered for a light breakfast under a tent on the north side of the Chemistry Building. The ceremony in the Harry G. Day Lecture Hall followed breakfast. Our departmental chair, Professor **Richard DiMarchi**, provided memorable words of motivation for their future, after which he and Professor **Dennis Peters** called

each student forward to spend a minute or two to speak about the student's accomplishments and future plans and to acknowledge the student's family and friends. We are very proud of our graduates and look forward to hearing from them as they begin the next phase of their lives. We welcome our graduates to keep in contact with us throughout their lives.

Chemistry Honor Roll

The following students are chemistry and biochemistry majors who have at least a 3.5 GPA and have been certified to the College of Arts and Sciences as meeting the Honor Roll criteria:

Class of 2010 (Freshman) Honor Roll: **Deepak Agarwal, Adam Alexander, Emilia Blaser, Anthony Bowen, Amy Dreischerf, Kurt Drury, Matthew Eskew, Travis Graham, Abby McCain Howenstein, Kathryn Lilly, Caitlin McKee, Elizabeth McKinney, Mitchell Reinholt, Adam Schaefer, Madhavi Singhal, Charlene Steiner, Christopher Trong-Linh Than, Jenny Troyer, Kyle Tse, Kerry Weber, Allison Wildin, Lauren Young, and Derek Zipkin**

Class of 2009 (Sophomore) Honor Roll: **Katherine Crichfield, Maureen Crispin, Jason Dyke, Nathan Farlow, Stephen Frantz, John Greco, Zachary Henson, Andrew Hollenbeck, Tyler Keena, Mary Koors, Alexander Kukreja, Tony Ljuldjuraj, Rachael McFarland, Joseph William Meisel, Katie Morris, Heather Muston, Dannielle Reeley, Chris Rohe, Philip Tischbein, Susan Wetzel, Livia "Livy" Wilz, Jay Wolverton, and Yun William Yu**

Class of 2008 (Junior) Honor Roll: **Alana Barbato, Jason Broecker, Kenneth Byrge, Michael Drazer, Matthew DuPre, Terry Easton, Brandon Govindarajoo, John Hardwick, Laura Heath, John Hegde, David Hocker, Ryan Holbrook, Katherine Israel, Haeun Kim, Sibol Lin, Deanna Miller, M. Francesca Monn, Bryan Morse, Ashley Phillips, Thomas Pottanat, Sarah Renner, Matthew Robinson, Alan Rosenbaum, Abrin Schmucker, Anand Subhash Shah, Alberta Soesanto, Erica Weyer, Joshua Wiley, and Jun Yin**

Class of 2007 (Senior) Honor Roll: **Khizar Ali, Michael Yoon-Phil Bang, Jessica Brown, Alexander S. Burn, Jun Chung, Adam Comer, Erica Daniel, Lindsay Darling, Mark**

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Undergraduate notes

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DeLeeuw, Justin Farlow, Philip Gach, Abram Hess, Cristina Hoffer, Theodore Jennerman, John "Jack" Kellie, David Kiefer, Robert Koffie, Christopher Kumfer, Joseph Tien Yo Lee, Smita Mahapatra, Kimberly Masden, Jeff Mayfield, Robert Mertz, Anthony Mitchell, Peter Morone, Zachary Quinkert, Erika Robertson, Bryan Schmidt, KaTat Siu, Daniel Stanko, Sarah Teter, and Carly Willenborg

Chemistry Honors Program

The following students participate in undergraduate research, have a BS chemistry or BS biochemistry major, and have at least a 3.3 GPA:

Class of 2010 (Freshman) Honors Program: **Graham Erwin**, **Asha Jamzadeh** (biology), **Stephen Mendenhall**, and **Jenny Troyer**

Class of 2009 (Sophomore) Honors Program: **Saif Ansari**, **Jenna Devare** (medical science), **Zachary Henson**, **Andrew Hollenbeck**, **Tony Ljuldjuraj** (medical science), **Joseph Meisel**, **Heather Muston** (biology), **Kristin Riley**, **Susan Wetzel**, **Livia Wilz**, and **Yun William Yu** (psychology)

Class of 2008 (Junior) Honors Program: **Nick Feipel** (medical science), **John Hardwick**, **John Hegde**, **David Hocker**, **Deanna Miller**, **Matthew Robinson** (medical science), **Abrin Schmucker**, **Alberta Soesanto**, **Vasu Tumati** (medical science), **Joshua Wiley**, and **Jun Yin**

Class of 2007 (Senior) Honors Program: **Kevin Armendariz**, **Jessica Brown** (psychology), **Alex Burn**, **Adam Comer**, **Lindsay Darling**, **Albert Fahrenbach**, **Justin Farlow**, **Philip Gach**, **Angela Halstead** (biology), **Theodore Jennerman**,

John Kellie, **David Kiefer**, **Robert Koffie**, **Robert Mertz**, **Anthony Mitchell**, **Peter Morone**, **Zachary Quinkert**, **Erika Robertson**, **Daniel Stanko**, and **Sarah Teter**

Department of Chemistry scholarships and awards

C117 Award: **Kathleen Gifford**

S117 Award: **Jeff Papiernik**

C118 Award: **Aliaksander Kurshuk**

The John H. Billman Summer Scholarship: **William Barker**

Harry G. Day Scholarships / Hutton Honors College Scholarships: **Emilia Blaser**, **Michael Drazer**, **Travis Graham**, **Stephen Mendenhall**, and **William Yu**

Ira E. Lee Summer Scholarships: **David Hocker** and **John Hegde**

Frank Mathers Undergraduate Summer Research Scholarships: **Andrew Hollenbeck**, **Matthew Robinson**, and **Jill Teige**

Earl G. Sturdevant Summer Research Scholarship: **Livia "Livy" Wilz**

The Votaw Undergraduate Summer Research Scholarship: **Susan Wetzel**

R.J. Grim Scholarships for 2007–08: **Jenna Devare**, **Katherine Israel**, **Mary Koors**, **Alberta Soesanto**, **Susan Wetzel**, and **Joshua Wiley**

The Andrew Loh Scholarship for Analytical Chemistry for 2007–08: **Zachary Henson**

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Chadon Photographers

Undergraduate notes

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Dennis G. Peters Scholarships for 2007–08:
Jason Broecker and **William Yu**

William G. Roessler Scholarship for 2007–08:
M. Francesca Monn

The Francis and Mildred (Ecktery) Whitacre Scholarships for 2007–08: **Tony Ljuldjuraj** and **Deanna Miller**

Enola Rentschler Van Valer Trafford Scholarship Awards for 2007–08: **Livia “Livy” Wilz** and **Jun Yin**

Russell and Trula Sidwell Hardy Scholarship for 2007–08: **Joseph Meisel**

Merck Index Awards: **David Hocker** and **Jessica Rice**

William H. Bell Awards: **Michael Drazer**, **John Hegde**, and **Sibo Lin**

ACS 2007 Undergraduate Award in Analytical Chemistry: **Joshua Wiley**

ACS Award: **Jessica Brown**

Hypercube Scholar Award: **Robert Mertz**

Joseph B. Schwartzkopf Award: **Zachary Quinkert**

Mary Frechtling White Award: **Sarah Teter**

James C. White Award: **Bryan Schmidt**

University and national awards

Barry Goldwater Scholarship: **Sibo Lin**

Paul E. Klinge Scholarship: **Joshua Wiley** and **Jill Teige**

Malcolm A. Kochert Scholarship from the College of Arts and Sciences: **John Hegde**, **Matthew Robinson**, and **Brittany Shepherd**

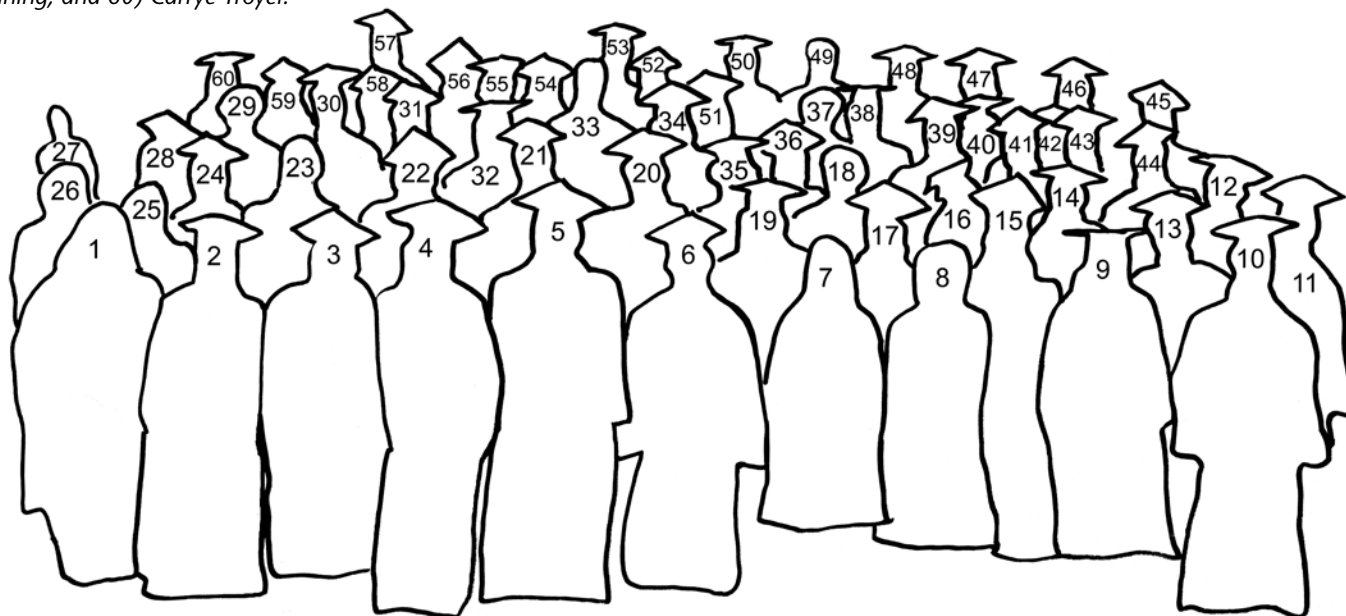
Life Sciences Scholarship from the College of Arts and Sciences: **Tony Ljuldjuraj**

Phi Beta Kappa: **Erica Cross**, **Michael Drazer**, **Lauren Galloway**, **Chris Heaton**, **John Hegde**, **Christina Hoffer**, **Theodore Jennerman**, **Noah Kersey**, **David Kiefer**, **Robert Koffie**, **Kyle Lammlein**, **Joseph Lee**, **Sibo Lin**, **Kimberly Masden**, **Mikel Newman**, **Emmanuel Obeng-Gyasi**, **Blake Prather**, **Jessica Rice**, **Erika Robertson**, **Alan Rosenbaum**, **Matthew Rybka**, **Bryan Schmidt**, **Mark Smith** (class of 2006), **Pamela Sontz** (class of 2006), **Daniel Stanko**, and **Sarah Teter**

Sigma Xi: **Philip Gach**

— *Kate Reck*

Graduation 2007: 1) Professor Cathrine Reck, 2) Brandon Wilson, 3) Christina Hoffer, 4) Jessica Brown, 5) Professor Richard DiMarchi, 6) Professor Dennis Peters, 7) Lindsay Hughes, 8) Eta Isiorho, 9) Aubrey Merrill, 10) Bryan Schmidt, 11) Daniel Stanko, 12) Shea Feree, 13) Elizabeth Gorenc, 14) Erica Daniel, 15) Melody Lao, 16) Gretchen Fasnacht, 17) Richelle Alcantara, 18) Rhea Smith, 19) Emily Smith, 20) Michael Bang, 21) Philip Gach, 22) Vaughn Ganiyu, 23) Mark DeLeeuw, 24) Eva Yihuo Luo, 25) Professor Andrea Pellerito, 26) Professor Jill Robinson, 27) Professor Thomas Tolbert, 28) Smita Mahapatra, 29) Sarah Teter, 30) Justin Farlow, 31) Abram Hess, 32) Todd Budreau, 33) Cory Szybala, 34) Stephen Zent, 35) Kyle Lammlein, 36) Marcus Aguilar, 37) John “Jack” Kellie, 38) Daniel Natelborg, 39) Garry Cooper, 40) Kimberly Masden, 41) Caleb Coffin, 42) Erika Robertson, 43) Nathaniel Jarvis, 44) Peter Morone, 45) Adam Comer, 46) Christopher Kumfer, 47) Michael Jones, 48) Pauley Gasparis, 49) Theodore Jennermann, 50) David Keifer, 51) Jacalynn Surma, 52) Alexandar Burn, 53) Blake Prather, 54) Amanda Dodds, 55) Jeff Mayfield, 56) Barbara Zickgraf, 57) James Allen Hall IV, 58) Joseph Lee, 59) Lindsay Darling, and 60) Carrye Troyer.



Rupert A.D. Wentworth

Nov. 5, 1934–
Sept. 5, 2007

Always the prepared individual, Rupert wrote his own obituary below. Rupert was the editor of IU•Chemistry for several years and is accordingly responsible for making it the impressive publication that it is today.

Rupert A.D. Wentworth was born Nov. 5, 1934, in Hattiesburg, Miss., the son of Rupert A. and Mary Blanche (Semmes) Wentworth. He was a descendant of John Marshall, the first Chief Justice of the United States, and Raphael Semmes of the Confederate Navy. Rupert lived in Bloomington since 1965.

He always liked a good story, particularly those that poked fun at him. He loved to tell a tale of his youth in the South, at a time when most people stayed in their hometowns almost all of their lives. He had never seen anyone from north of the Mason-Dixon Line, but, like all southern boys in



Rupert Wentworth interviews for a story in 2004.

those days, he had been thoroughly indoctrinated about the evil carpetbaggers from the North who, stealing and pillaging, invaded the South immediately after the Civil War, a war that was less than a hundred years in the past. So seeing the newly federalized Ohio National Guard on their way to a camp outside his hometown early in 1942 was a shock. He was sitting on his front porch when they marched by. Suddenly realizing who they were, he ran indoors, yelling “Momma, Momma! The Yankees have come back!”

He received his undergraduate education in chemistry at Fordham University. He was a

two-year member of the university’s championship mile relay team, but he often ascribed his first-place medals to the efforts of the other three members of the team.

On the day of his graduation, he was commissioned in the U.S. Marine Corps and served as a line officer with the 2nd Marines. Following his release, he worked as a chemist for W.R. Grace, first in Belleville, N.J., and then in Baton Rouge, La. When he realized that he needed more chemical education, he attended Michigan State University, where he was an Eastman Kodak Fellow and then a National Science Foundation Fellow studying the lower oxidation states of niobium. After receiving his PhD, he spent two years at the University of Illinois as a postdoctoral associate studying the application of polarized crystal spectra to ligand field theory.

Wentworth came to IU in 1965. His graduate students investigated unusual geometries of transition metal complexes caused by rigid ligands and metal-metal interactions in certain dinuclear molybdenum and tungsten compounds. Later, his students studied inorganic models for molybdoenzymes. He received several teaching awards for general chemistry, but his favorite was a Student Choice Award for Outstanding Teaching. He was the first coordinator of general chemistry in IU’s chemistry department, spending several years revising and updating the experiments for the general chemistry program.

He wrote many research papers, a textbook, and several lab manuals. After his retirement, he became editor and chief writer for the chemistry department’s alumni magazine, *IU•Chemistry*. He also wrote an autobiography titled *Caught with my Pants Down*, which portrays his early battle with metastatic prostate cancer. The title represents the numerous surprises he had during this fight, but it was also a description of the situation of his clothing during innumerable inspections of his prostate gland.

Wentworth chaired the first Project Seed for the American Chemical Society, a project dedicated to increasing the number of chemists from minority groups. He served on Monroe County’s Board of Health during the time when the county, at the board’s insistence, banned smoking in restaurants and bars outside of Bloomington. The city followed suit several years later. He and his wife, Anne, with the help of others co-founded the Wednesday Kitchen, now known as the Wednesday Pantry, at the First United Methodist Church, providing food for the working poor as well as those without jobs. He also served on the church’s Administrative Council.

In memoriam

Harry G. Day Oct. 8, 1906–Sept. 8, 2007

Harry G. Day, 100, of Bloomington, died in his sleep in the Comprehensive Care Unit of Meadowood Retirement Community. He was one month shy of being 101 years old.

Born to John Freeman Day and Minta E. Spencer in Monroe County, Iowa, Oct. 8, 1906, Harry worked on his father's farm before attending high school in Chariton, Iowa, and Cornell College in Mount Vernon, Iowa, where he graduated with an AB in chemistry. He received a doctorate of science in biochemistry from Johns Hopkins University, Baltimore, in 1933.

Following a year as a National Research Council Fellow, he went to Yale as a General Education Board Fellow and then returned as an associate in the Department of Biochemistry at Johns Hopkins (1936–40). There he established his lifelong career in nutrition, working with Elmer V. McCollum and C. Orient-Kies on *The Newer Knowledge of Nutrition*, fifth edition, published in 1939.

Day joined the chemistry faculty of Indiana University in 1940 as an assistant professor, and in 1950 he became a full professor. His love for our department has been mirrored in his guiding service to it — he was our chairman between 1952 and 1962. Day also devoted considerable time and energy in writing *Development of Chemistry at Indiana University in Bloomington*, a book in which he describes the department's history up to 1991. Day also served the university in several capacities. In addition to many committee assignments, he was associate dean for research and advanced studies from 1967 to 1972 and special assistant in the office of research and development from 1973 to his retirement in 1976. He received the IU President's Medal for Excellence in 1990 and the university's Distinguished Service Award in 1993.

Throughout his academic career, he was a pioneer in zinc research and authored more than 200 scientific publications. Perhaps, how-

ever, the accomplishment for which he is best remembered by everyone is his contribution to the development of Crest toothpaste. In the 1950s while at IU, Day, J.C. Muhler, and W.H. Nebergall conducted research on the effects of fluorides in the reduction of dental caries. The result of this research was the first dentifrice containing stannous fluoride, Crest toothpaste.

Day's interest in nutrition expanded to include significant contributions to the American Institute of Nutrition; American Institute of Biological Chemists, where he served as president; and the Indiana Academy of Science. He was named a Sagamore of the Wabash in 2004. Throughout his career, Day mentored hundreds of students and often provided financial support to enable them to continue their education.

Day was interested in wherever he thought he could be of service not only professionally, but locally through civic organizations such as Kiwanis and Bloomington Hospital, where he was the first male to serve on the Women's Board. An active Republican, he served on the Bloomington City Council in the 1960s. During that time, he championed the fluoridization of the Bloomington water system.

Day has also been a moving force within the First United Methodist Church, serving as a trustee for a number of years. He also loved Bloomington, and he loved it enough to have tossed his hat into the city's political ring. He was elected to the city council and served in that body for eight years until 1971. Some of the issues that he must have considered include the effect of the 1970 census on the city, as well as the city's plan to turn Kirkwood Avenue into a mall between the court house and IU. For his contributions to our department, the university, and the city, Day was elected to the Monroe County Hall of Fame. Moreover, the main lecture hall in the Chemistry Building as well as a lectureship bears his name.

In memoriam

Frank R.N. Gurd Jan. 20, 1924–June 17, 2007

Frank R.N. Gurd died on June 17, 2007, as a result of complications of Parkinson's disease. The son of Fraser Baillie Gurd, M.D., and Jessie Gibson Newman, Frank R.N. Gurd was born in Montreal, Canada, on Jan. 20, 1924. He attended Phillips Exeter Academy, and then McGill University, where he received first-class honors in biochemistry and won the Hiram Mills Gold Medal in Biology with a BSc in 1945. He was awarded an MSc in 1946 from McGill. He received his PhD from Harvard in 1949 for work involving the fractionation of serum proteins and for determining the physical structure of LDL. Gurd was visiting professor at Washington University School of Medicine and taught at Cornell University Medical School, Indiana University School of Medicine at Indianapolis, and Indiana University Chemistry Department in Bloomington where he rose to the rank of IU Distinguished Professor. He retired from IU as a distinguished professor emeritus. In 1989, he moved to Albuquerque, N.M., with his late wife, IU Professor Emerita Ruth S. Gurd, M.D.

Gurd published more than 160 scientific papers and review articles. He was a member of the American Society for Biochemistry and Molecular Biology and other scientific societies, served on research

funding agency study sections, and served as a reviewer for a number of scientific journals. He was proud of his contributions as an associate editor of the *Journal of Biological Chemistry*. Throughout his academic career, Gurd emphasized the relationship of structure and function in plasma proteins, enzymes, myoglobin, and hemoglobin. Along with his late wife, Gurd taught many students in the chemistry and biochemistry department at Indiana University and at the IU Medical School (they were enormously proud of their active involvement in the combined degree program). Many of Gurd's students have gone on to have outstanding careers in the field of medicine and science.

In addition to being a first-class scientist and science educator, Gurd and his late wife were very active in the music scene, both in Indiana and in Albuquerque. His knowledge of classical composers and their compositions was breathtaking. Both husband and wife were active supporters of the arts, humanities, and science. Gurd had a dry wit, was enormously considerate to others, and was a loving father, grandfather, and husband. He was enormously proud of his four children, four grandchildren, and other members of his immediate and extended family.

OUT & ABOUT WITH ALUMNI

Alumna profile

Anita Spitz and the road less traveled

When Anita Spitz left IU's Bloomington campus in 1983 with a BA in chemistry, she was a rarity: She had completed all 10 chemistry honors courses. Moreover, she had done research with Professor Frank Gurd on sperm whale myoglobin.

She, like Robert Frost, had found two diverging roads and took the one less traveled. It was an alternative path.

After medical school in Indianapolis, she became a family practice specialist at Phoenix Baptist Hospital in Arizona, but then moved to Florida

to participate in a large group practice in Orlando. Then in 2000, she opened a solo practice in Titusville.

Her medical career at this point seems entirely standard, but Spitz is not a physician weighed with conformity. She wanted to practice medicine in a different way, so she went to UCLA and received certification in acupuncture. She has since received training in vitamins, supplements, herbs, and electrical medicine.

When I read about her training in electrical medicine on her Web site, I wondered immediately about this technique. After all, electricity played a major role in my PhD research: studying compounds prepared after electrochemically generating niobium(IV) from niobium(V). I found, however, that she is referring to microcurrent electrical stimulation. This treatment, she says, can provide many of the benefits of acupuncture, while being easier to administer, so easy that patients can treat themselves at home.

Her Web site also contains other nuggets, including the philosophy guiding her practice. She says there that "the human body is robust and versatile.

It can tolerate surprising amounts of abuse and neglect. However, we expect it to last far longer than our car or other less complex entities that we own. ... A doctor can fix many things that go wrong with a body. However, there are many things that Western medicine cannot fix, particularly chronic problems that arise with advancing years."

As one with chronic problems due to advancing years — problems that seem to bemuse many of the physicians that I see — her last sentence drew my attention. She was speaking a language I could relate to easily.

Her Web site goes on to say that, realizing she could not treat these problems effectively by conventional Western medicine, she was driven to explore alternative medicine. Spitz found that alternative medicine is somewhat less cut and dried than its conventional Western counterpart. As a result, she spends more time with her patients, finding out their history, the probable cause of their problems, and what she can offer to bring them to optimal health. Emphasizing that the patients are ultimately responsible for their own health, she expects them to work with her to improve their lifestyle, and in doing so, improve their chances for good health. Good nutrition is a centerpiece in her approach.

Spitz provided more information in an e-mail to me, saying that she continues to practice traditional family medicine, but at least 50 percent of her practice now involves her alternative expertise.

She is now a physician leader in the local hospital, Parrish Medical Center, and as of January 2006, she is chief of the Family Practice Department at the hospital.

When I first wrote this story, I had hoped to find a defining moment: something that had beckoned to Spitz, causing her to take her first steps down the road less traveled. I thought that pinpointing that moment would close the circle of the story and provide a final symmetry. But true life and the symmetry of a story rarely coincide. She grew up in Griffith, Ind., a town very close to Gary, and no physicians were in her extended family. Although a brother was in a serious car accident while she was in medical school, his treatment was conventional, and he recovered. Probably, like most of us, Spitz ended up doing what she does for a myriad of little reasons.

Spitz lives with her husband and her daughter. She has a second-degree belt in Aikido, which allows her to be an instructor as she continues her training. She also loves bicycling and yoga.

— Rupert Wentworth



Anita Spitz

Indiana University's network of Alumni chapters in major metropolitan areas around the world provides stimulating, enriching, and exciting activities to keep members of the IU family connected to the university — lifelong and worldwide. With programs such as faculty presentations, cultural events, career networking forums, and activities to recharge your Hoosier spirit, IU alumni chapters provide a lifetime of opportunities to keep you connected wherever you live.


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Robert Dégeilh returns to IU — by way of China

It was cold on that day in January 1953 when I arrived at the chemistry department after a long trip from France by boat, train, and bus. When I got to the entrance, someone took my heavy suitcase (that someone, I learned later, was Walter Moore, professor of physical chemistry). He then introduced me to Professor Harry Day, who to my astonishment invited me to dinner at a downtown Italian restaurant, something I had not expected. What a change from the very formal French university professors!

France had been liberated from the Germans by American GIs only a few years earlier. We were free again. And now I was in the land of liberty. Perhaps it was prophetic that I came on a boat called *Liberte*. I came because I had been offered a research assistantship by Professor Lynne Merritt to work on the crystal structures of chelate compounds.



I did my computations at night in the basement of Bryan Hall on IBM machines on loan from the university administration. We shared them with Marshal Wrubel and Alfred Kinsey. President Herman Wells would drop by often before going home to ask us if the equipment was satisfactory and if we were pleased with our work. I would leave at two or three in the morning.

I enjoyed my years at IU: I liked the research, other graduate students, the picnics in Brown County, the shows we put on, and the evening square dances in front of the Union.

When I received my PhD, Cal Tech offered me a postdoc in Linus Pauling's group. I found myself refining the structure of diketopiperazine that Professor Corey had determined in 1938. The object was to locate the hydrogen atoms. I got beautiful crystals and good data, so good that I was able to locate precisely the positions of the hydrogen atoms. Later I learned that the structure of this molecule gave Watson and Crick a clue that helped them solve the structure of DNA.

On my return to France, I could not get a position at the university because I had an American PhD! Finally, I found a job in research at Saint-Gobain, a glass and chemical company, to work on semiconductors. Solid state physics and the study of surfaces were new to me and I took great

pleasure going into them. But in a few years, I found myself working on all the materials associated with glass.

After I retired, I enlisted in ECTI, an organization that was helping developing countries. It happened that China was interested in the production of interlayer polyvinylbutyral safety film, a process that I developed at Saint-Gobain. In 1992, I was invited to lecture in Tianjin and in Guyang (Guizhou province), and my relationship with China and the Chinese chemical industry began.

Although I met engineers with a very good knowledge of chemistry, the industry was in a very poor state. I spent six months developing my process. Modern (but used) equipment — equipment that I found in France and the Tianjin Organic Chemical Co. succeeded in importing — was new to the workers, who were largely untrained. The outcome, however, was successful.

(continued on page 34)

Inset — Photo taken in 1953 for Robert Dégeilh's ID card

Below — From left, Lynne Merritt, Robert Dégeilh, and Harry Day in April 2000





25 YEARS AGO

From the March 1982 issue of the *Association of Indiana University Chemists Newsletter*.

Robert Degeilh, PhD'55, visited the department a few days from his home in LePort-Marly, France. This was his first trip back to Bloomington and he says he wants to visit us again with his family to show them the school he attended.

Frank R.N. Gurd along with Jay A. Berzofsky of the NIH and their colleagues have developed a semisynthetic procedure for reconstructing myoglobin, the oxygen-bearing protein in muscle cells [Proc. Natl. Acad. Sci., 79, 7739 (1982)].

Felix M. Barker II, BA'70, BS'71, OD'73, is a professor and associate dean for research and academic development at the Pennsylvania College of Optometry. His daughter, U.S. Army Captain Adrienne R. Barker, BA'02, has recently returned from her second tour of duty in Iraq. Barker serves with the 440 Signal Battalion and is stationed in Germany. She was a platoon leader in the 2003 Iraq invasion and was the deployment officer for the battalion's recent redeployment.

Matthew T. Boren, BS'97, BA'00, of Fishers, Ind., is a systems administrator at Sallie Mae Inc.

Brett A. Brechner, BS'94, practices family medicine, including obstetrics, pediatrics, internal medicine, and geriatrics, at Winfield Family Medicine in Crown Point, Ind. In 2005, he participated in medical mission-trips to Thailand during tsunami relief and to Mississippi during Hurricane Katrina relief. Brechner and his wife, Jinna, live in Chesterton, Ind.

Christopher B. Carpentier, BS'96, JD'00, joined the Indianapolis law firm of Riley Bennett & Egloff as an associate attorney.

William F. Carroll Jr., PhD'78, presented a lecture, *Where Everything Comes From: Industrial Chemistry 101*, for the general meeting of the central Arkansas local section of the American Chemical Society at Ouachita Baptist University. He is vice president of chlorovinyl issues for Oc-

cidental Chemical Corp. and an adjunct professor of chemistry at IU Bloomington.

Judith Waskow Chin, BA'90, DDS'94, is an associate professor at the Oral Health Research Institute of IU's School of Dentistry. She received the 2006 Indiana Dental Association's Outstanding Teacher of the Year Award in October.

Philip A. Downing, BA'93, has been promoted to assistant general manager and director of analytical services at Bioanalytical Systems Inc. in Evansville, Ind. He lives in Newburgh.

Lawrence H. Einhorn, BA'65, Res'70, of Indianapolis, has become known as the man who helped cure Tour de France cycling champion Lance Armstrong of testicular cancer. He began his studies of chemotherapy in testicular cancer, using a platinum-based drug, in 1974. The treatment, which has increased the cure rate with metastatic testis cancer from 5 percent to 80 percent, became standard after the first study. In 2006, Einhorn was named the first Lance Armstrong Foundation Professor of Oncology at IU and received the Distinguished Alumni Award from the College of Arts and Sciences at IU Bloomington.

Andrew I. Engel, MS'88, has practiced in obstetrics and gynecology in the Washington, D.C., area since 1996. He lives in Bethesda, Md., and has two children. "Both like making potions," he writes, "maybe they are future chemists."

Since the local hospital closed more than two years ago, **Terry C. Gehlhausen**, MS'80, is the only doctor in rural Oakland City, Ind. He works

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Dégeilh

(continued from page 33)

I think Ma Junru, the vice minister in charge of foreign exchange, was pleased when he visited us because I was then invited to dinner with six other foreigners on Chinese New Year's Eve by Prime Minister Li Peng. It was a very pleasant affair, one that allowed me to talk freely with the prime minister. A year later, in 1994, I received the Friendship Award on the occasion of the 46th anniversary of the founding of the People's Republic of China.

In 2000, I had an opportunity to return to the U.S. to buy up-to-date equipment. I stopped in Bloomington to visit Lynne Merritt and Harry Day. I am glad I did because it was the last time I saw Lynne before he died.

My work was recognized again in 2001 when I, along with four others, received the Science and Technology Award. Unfortunately, I was unable to attend the ceremony because of family reasons.

It was very pleasant working with the Chinese. Their lifestyle was similar to the one I had known in France before the war,

and I had no difficulty adapting to it. People were warmly friendly and their social life was very developed. Most of them had a small home heated by a coal furnace. The salaries were low, but the plant supplied bags of rice on certain occasions. Each plant also had a doctor who provided medications. Moreover, the plants were a place of entertainment with an orchestra and a dance hall. Singing and dancing were occasionally part of our nighttime activities.

China gave me the opportunity to get more involved with the IU chemistry department. Huang Xinlei, the niece of the plant director, Huang Jiawei, finished her undergraduate studies and wanted to do graduate work in the U.S. I thought the best place she could go would be my alma mater, and she was successful in obtaining a scholarship from the department. She met a Chinese man, Xiaohu Li, there and they married in March 2006.

I am reliving my student years at IU through her, and I hope I will not need to wait another 50 years to write the next chapter of this beautiful story.

From a story by Robert Dégeilh that was condensed by Rupert Wentworth

Department launches 'Horizons in Chemistry'

Launching your chemistry career is full of many unknowns: What is it like to do research outside of a university environment? What is important to potential employers? What should I be doing now to understand my options and to be prepared?

These questions don't have a single or simple answer, but achieving a good perspective on these questions is a vital part of early career development.

During the 2007 spring semester, the Department of Chemistry launched a new seminar series called "Horizons in Chemistry." The purpose is to provide students and postdoctoral researchers with a perspective on non-university research and careers. Professor Ken Caulton, one of the initiators of the series, said, "The Horizon series is intended to increase student professional awareness on factors outside the usual PhD experience."

Speakers provide two critical contributions to the department during their visit. Each speaker gives a department seminar on their current research interests to illustrate the kind of problems that chemists solve. Each speaker also participates in a career roundtable meeting with students to informally discuss career experiences

and to provide valuable insights into career development. "The series provided me with a variety of research exposures, personal perspectives, and information to better prepare me for the future," commented graduate student Justin Riddle.

Speakers have included both alumni and non-alumni and have covered a broad diversity of topics and experiences:

- Ken Miller, GE Plastics, "The Green Technology Revolution"
- Fred Larimore, Cook Pharmica, "Productivity Enhancements in Bio-processing"
- Bill Carroll, Occidental Chemical, "Where Everything Comes From"
- Dawn Brooks, Lilly, "Chemist Role in Reducing Drug Development Cost"
- Nick Magnus, Lilly, "Synthesis of 4-Cyano-Pyrroles"
- Patricia Hubbard, Momentive Materials, "Feeding the Semi-Conductor Industry"
- Michael Ramsey, University of North Carolina, "Conducting Research in National Labs, Academia, and Startup Companies"

Students take an active role in the series by developing the schedule for each

speaker and by facilitating the career roundtable process. While student participation is completely voluntary, the interest has been strong and feedback very positive. Postdoctoral researcher Nic Zorn said, "I got a lot from this experience on both a scientific and personal level. ... I would like to thank them all."

The "Horizons in Chemistry" series resumes this fall with three alumni scheduled to present: **Al Sattleberger** (Argonne National Labs), **Eric Thaler** (Momentive Materials), and **Curtis Holmes** (GreatBatch). We are now in the process of identifying speakers for the spring and for next fall. If you would be willing to share your research efforts, your career experiences, and a couple of days of your time with the young chemists in the IU Department of Chemistry, we would like to hear from you. A long career in chemistry is not required to be a valuable contributor to this effort. Please communicate your interest to **Ken Miller** at ken1.miller@ge.com or **Bill Carroll** at William_F_Carroll@oxy.com. You will find this experience to be refreshing — and an excellent opportunity to renew your contact with the department and to pay back the department for the impact it has had on your career.

— Ken Miller

Alumni news

(continued from page 34)

at the Oakland City Clinic and treats all of the residents in town.

Todd E. Gordon, BA'88, is the new president of Benefits Group Inc. in Atlanta. He has worked at the benefits-consulting firm, which serves small and midsize employers, for 10 years. Previously, he was vice president. In his new role, Gordon oversees the launch of the company's Web-enabled services. He lives in Johns Creek, Ga.

Mark A. Gromski, BA'06, of South Bend, Ind., was named the 2006 Scholar of the Year by the Western Golf Association and the Evans Scholars Foundation. He now attends Harvard Medical School in Boston.

Michael R. Hartman, BA'77, JD'80, has been reappointed chairman of the litigation department of Bingham McHale in Indianapolis. Hartman has more than 20 years of experience in civil litigation, including real estate and other business litigation matters. He leads the law firm's business-litigation industry team.

Worthe S. Holt Jr., BA'78, MD'82, was named 2007 Indiana Aviator of the Year by the Indianapolis Air Show executive committee. He is executive vice president and regional chief operating officer for St. Vincent Health, serving various St. Vincent hospitals in Indiana. Holt, of Fishers, is a colonel in the U.S. Air Force with 25 years of service.

Hugh W. Johnston, PhD'48, is a professor emeritus of chemistry at Whitworth College in Spokane, Wash. "Doctoral study at IU prepared me well for volunteer processing of papers for Northwest Digital Archives," he writes. His inventory work can be found at www.nwda.wsulibs.wsu.edu.

Chemist turned artist **Ted Largman**, PhD'52, has taken first place in the mixed-media category for two years running at an annual art show at the Jewish Community Center in Whippany, N.J. Among his numerous artistic accomplishments, Largman was deemed a Renaissance man in *Renaissance Magazine*, the official publication of the New Jersey Foundation for Aging in April 2005. He had a 39-year career as a senior

(continued on page 36)

25 YEARS AGO

From the March 1983 issue of the *Association of Indiana University Chemists Newsletter*:

The BS degree in biochemistry, introduced in 1981–82, has met with a good deal of student interest. Semester I, 1982–83, 14 seniors and 27 juniors were declared BS biochemistry majors. We expect to graduate 10 students with BS biochemistry degrees this May.

[Editor's note — In 2007, biochemistry is now our No. 1 major. Seventy-five percent of our undergraduate majors are in biochemistry.]

Alumni news

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research chemist and holds 35 patents, including a fiber used in car air-filters. Largman lives in Morristown.

Gregory N. Larkin, BA'71, MD'74, is director of corporate health services for Eli Lilly and Co. in Indianapolis. He is responsible for the supervision of health-care delivery for Lilly employees, retirees, and dependents through the management of on-site clinics and benefit design of the domestic health plan. He also serves as corporate medical adviser for all global affiliates. Larkin is president of the Indianapolis Medical Society.

In September 2003, **Herb Levetown**, BA'49, sold Bernel Chemical Co. Inc., a company he formed in 1982. Bernel manufactures surfactants for use in the cosmetic industry. Now retired, Levetown lives in Tenafly, N.J.

Thomas W. Moffo, BA'80, MD'84, Res'87, is on the medical advisory board for Dermacare Laser & Skin Clinics. Moffo, who has 15 years of emergency-room experience and is board certified in internal medicine, lives in Phoenix.

Mary Mahon Munchak, BA'81, BS'82, is a laboratory manager at Inova Fair Oaks Hospital in Fairfax, Va. She recently received her MBA in health-care administration from Regis University. Munchak lives in Clifton.

Bruce F. Paterson, BA'75, is an allergy and asthma physician in Concord, Calif. He and his wife, Maggie, have two children, Raemy, 14, and Seth, 11. "I watched IU play in the NCAA tournament in Sacramento — proud to be an alumnus," he writes. The Patersons live in Pleasant Hill.

Alicia M. Prater, BS'02, successfully defended her dissertation, "The Role of Single Nucleotide

Polymorphisms in the Angiotensin II Type 1 Receptor Gene in Hypertension," at New York Medical College. She has been a teaching assistant and lecturer for the pathology department at NYMC, and she writes that she hopes to continue teaching and pursue science writing. Prater moved to Raleigh, N.C., in December.

The Committee on Data for Science and Technology is an interdisciplinary committee of the International Council for Science. The 2006 CODATA Prize has been awarded to **John Rumble**, technical director for Information



International Associates. Rumble received the prize in Beijing on Oct. 22, 2006. The prize is awarded biannually for outstanding achievement in scientific and technical data. Rumble, former director of the Standard Reference Data Program at the National Institute

John Rumble

of Standards and Technology, was honored for being "an innovator in the world of scientific and technical data." He has been instrumental in extending data-evaluation techniques in new disciplines, including engineering, materials, and biotechnology. Rumble has long been a leader in using advanced information technology for developing computerized databases, online data networks, and data exchange standards. He received his PhD in chemical physics from Indiana University in 1976.

Ricardo R. Salvat, BA'76, has been commissioned as a lieutenant colonel in the U.S. Air Reserve Base. He is the officer in charge of optometry at the 434th Aerospace Medicine Squadron at Grissom Air Force Base in Indiana.

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Necrology

We received notices of the following deaths of alumni since the fall 2006 issue of *IU•Chemistry*.

Burton L. Appleton, PhD'58, August 2007
James W. Asher, BA'40, MD'42, May 14, 2007
Richard A. Balakir, BA'63, May 6, 2006
Robert R. Buck, BS'42, Oct. 27, 2006
Kenneth T. Burck, BS'58, Dec. 23, 2006
Timothy Ting Yue Chan, BA'74, Dec. 13, 2006
Jennifer Gluckman Feldman, PhD'85, Dec. 27, 2004
Floyd Z. Fiedler, BA'47, Jan. 19, 2007
Benjamin Greenberg, BA'36, April 27, 2006
Edwin E. Gregg, BA'42, MD'44, Oct. 13, 2006
Charles P. Hamer, BA'47, DDS'51, Sept. 13, 2006
Martin Hamer, BS'49, Dec. 5, 2006
Robert W. Harger, BA'43, MD'45, Nov. 3, 2006
Claude D. Holmes, BA'42, MD'44, Dec. 1, 2005
James L. Hudson, BA'54, Feb. 8, 2007
Richard N. Land, BA'42, MD'44, March 10, 2007

Pasquale Martignoni, BS'49, June 5, 2000
Brooker Lowell Masters, BA'39, MD'42, Nov. 10, 2006
Joseph P. Ornelas, BA'41, MD'43, Nov. 28, 2006
Delbert E. Philpott, BA'48; MA'49, Dec. 11, 2005
John W. Rector, BA'63, May 25, 2005
Alexander J. Russo, MS'67, Oct. 8, 2006
Frank M. Scott, BA'34, MD'37, April 15, 2007
Bernard G. Searle, BA'49, Oct. 5, 2006
John A. Shanks, BA'37, July 7, 2006
Fred N. Tebbe, PhD'63, Sept. 28, 1995
Rogert L. Veith, BA'81, Oct. 13, 2006
Bernard M. Winner, BA'42, Oct. 9, 2006
Anna Kurilovitch Woods, BA'43, Jan. 17, 2002
William W. Wright, BS'49, March 22, 2004
Charles L. Zirkle, BS'42, Jan. 26, 2006

Alumni news

(continued from page 36)

He is a staff optometrist at the Veterans Affairs outpatient clinic in Evansville. His son Antonio, BA'06, is studying clinical psychology in graduate school in Chicago, and his son Daniel attends IU Bloomington. Salvat lives in Newburgh.

John J. Schwegman, BS'92, is the chief scientific officer at BioConvergence, headquartered in Bloomington, Ind. The company provides pharmaceutical product development, engineering and supply-chain consulting, controlled-temperature storage, and inventory management for pharmaceutical industry clients.

Greg P. Sutton, BS'70, is the medical director of gynecologic oncology at St. Vincent Hospital in Indianapolis.

Robert L. Waters, BA'62, is the medical director of Rancho Los Amigos Medical Center in Downey, Calif. He lives in Downey.

Lisa M. Albregts Weiler, BS'89, MD'93, and **Michael J. Stowell**, BA'88, MD'92, founded Southern Indiana Physicians for Women in January 2001 in Bloomington, Ind. Since then, the building has been demolished to its shell and rebuilt, expanding the space by 25 percent. Both physicians performed their residencies at St. Vincent Hospital in Indianapolis and are board-certified in obstetrics and gynecology.

Timothy S. Wells, BA'94, MS'96, MD'99, has been appointed assistant professor of ophthalmology at the Medical College of Wisconsin and to the medical staff of Froedtert Hospital, the Children's Hospital of Wisconsin, and the VA Medical Center in Milwaukee.

Jennifer Challgren Whitaker, BA'02, MD'06, is an internal medicine resident at Emory University in Atlanta.

Gary D. Wiggins, BA'66, MA'68, MLS'71, PhD'85, is an adjunct professor and director of the Chemical Informatics Program at the IU School of Informatics in Bloomington, Ind. He received the Special Libraries Association Hall of Fame Award in June 2007. Only 124 people have received the award since the organization's inception in 1959.

Peter G. Wolynes, BA'71, ScD'88, was inducted to the American Philosophical Society in April 2006. He is the Francis H.C. Crick chair in the physical sciences at the University of California in San Diego.

15 YEARS AGO

From the August 1992 issue of the *Association of Indiana University Chemists Newsletter*:

In early 1992, the IU Molecular Structure Center moved out of the old two-story Quonset hut and into the newly remodeled laboratory facilities in the Chemistry Building.

Rupert Wentworth resigned as coordinator of general chemistry to return to teaching.

'Ode to Wentworth'
*Manuals, scanuals
Rupert A.D. Wentworth,
Taught freshman chemistry
for many years.*

*By investing much time
in helping the students
try new experiments,
he cured their fears.*

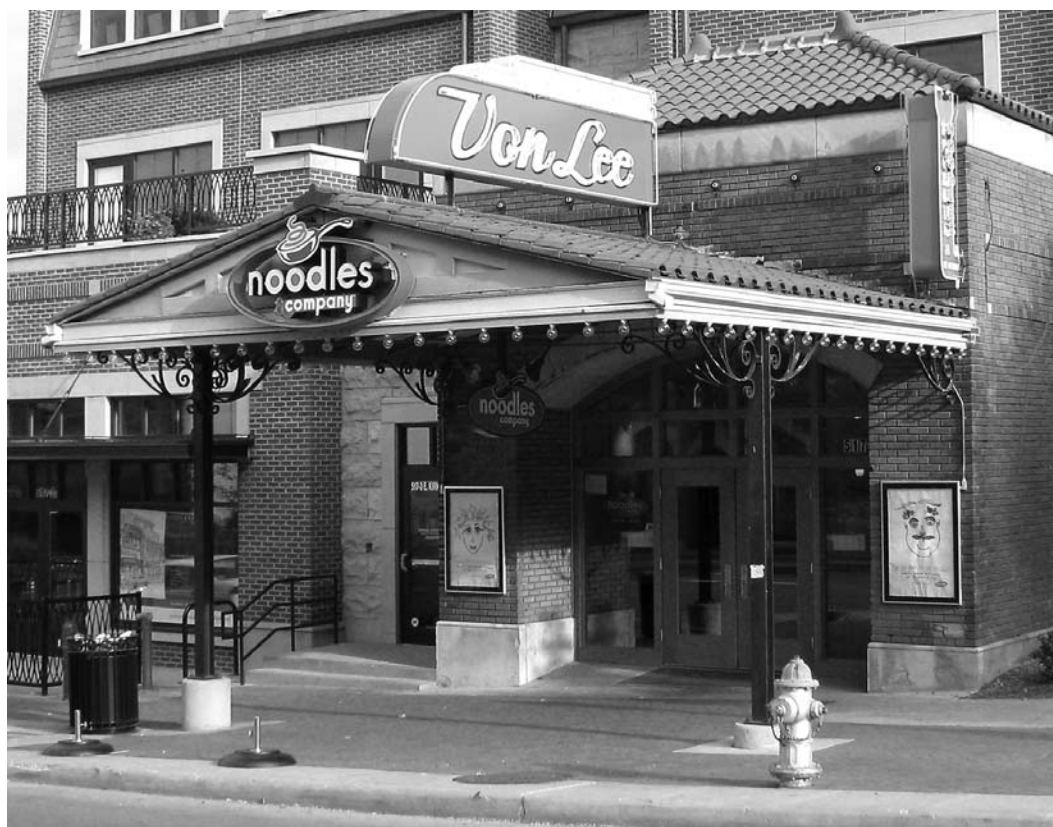
Harry G. Day, who is a graduate of Johns Hopkins University, was named one of 75 Heroes of Public Health, in connection with the observance of the 75th anniversary of the founding of the school in April.

John Huffman has been named the 11th most productive scientist in the world by the Institute for Scientific Information.

Movies are harder to see, but the food is much better. Many will remember the Von Lee Theater, long a Kirkwood Avenue landmark. The movies disappeared long ago and years of neglect took its toll. Now it has morphed into a Noodles restaurant in a new office building with the old familiar façade, with IU's Office of Creative Services taking up residence in the upper level of the building.

We want to hear from you!

Fill out the form on page 40 and send it to us. We'll publish your news in a future issue of *IU•Chemistry*.



CHEMISTRY HONOR ROLL 2006

Abraham, Aleyamma	Combs, Jan Arvin & James	Godomsky, Stephen	Krieger, Paul & Barbara
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Anders, Timothy & Ana Thompson	Counes, Steven	Grant, Phyllis	Kurtz, Wendy
Anex, Deon & Lisa	Coveleskie, Joan Marie	Gratz, Rachel & Conrad	La Belle, Ellen & Frank Jr.
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Aprahamian, Ani	Crandall, Jack	Green, Leslie & Harold	Leahy, Jeanette
Aronoff, George & Angela	Crelier, Arnold	Gregory, Andrew	Leal, Joseph
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Bair, Edward & Dorothy	Dalman, David	Hall, Arthur & Dorothy	Levetown, Herbert
Baker, Raymond	David, Paul	Hammersley, Vernon & Sue	Levy, Melvyn
Ball, Donald	Davis, Dwight	Hamori, Paul	Lewis, Larry & Ricki
Balliet, Craig & Margaret	De Las Alas, Vincent & Kimberly	Harrison, Nancy & Russell	Lidster, Reuben
Bannister, Thomas	Delphin, Walter	Hauber, David	Light, James & Nina
Barber, Richard	DeMattia, Gregory	Hays, Robert	Lin, Luan-Ho & Cheyeh Lin
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Bruce, Carol	Fike, Steven	Kagel, John Jr.	McChesney, James
Brugman, Helmut & Aija	Fisher, Doris	Kaplan, Maxine	McDonald, Amy
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Canada, Emily & John	Franz, John & Martha	Kindig, John & Wendy	Middendorf, Max
Carmack, Marvin	French, Robert	Kindsvater, John	Milbourn, Jeffrey & Sara
Carroll, William Jr. & Mary	Froning, H. R.	King, Ada	Miller, Kenneth
Chan, Osmund Tak-On	Frump, John & Norma	King, Gerald	Miller, Steven
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Chisholm, Roy III	Galley, Paul	Kinnaman, Rob & Cheryl	Moore, William & Katherine
Chmiel, Andrew & Gloria	Garrett, David	Kleindienst, Tadeusz	Moore, William Jr.
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Chung, John	Gay, Frank	Kochell, Jay & Jean	Moss, David & Kathleen
Clemmer, David & Wendy Saffell-Clemmer	Gebre-Egziabher, Ytbarek & Semainesh	Kovach, Paul & Susan	Cornely-Moss
Cliff, Johnnie Marie	Georgiadis, Taxiarchis & Millie	Chintis-Kovach	Moss, Herbert
Cline, Richard & Janet	Ginger, David & Van Huynh	Krauchs, Stanley Jr. & Jane	Muser, Frani Blough
Colvin, Oliver & Arline	Gnewuch, Charles & Julie	Kreighbaum, William & Carolyn	Nagle, Joel
		Krieger, Nancy Sue	

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Honor roll

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Nash, Brian & Amanda
Neff, Mark & Lea Ann
Ng, Elaine & Raymond
Nikolaisen, Georgia
Noel, John
Northuis, Jill & Michael
Nugent, William & Susan
O'Bryan, Nancy
O'Connor, Hazel
Oster, Greg
Owens, Kevin & Judith
Edling-Owens
Pack, Mary & Brian
Paterson, Bruce & Maggie
Paulson, Donald & Elizabeth
Paur, Richard & Sandra
Pendley, Rex
Perkins, Greg
Peters, Dennis
Peterson, Stephen
Pletcher, Terry & Marga
Potratz-Driver, Paula &
Orlando Driver
Powell, Christopher
Po-Yuen, Chiu
Prather, David
Pratt, Ralph Jr.

Radding, Jeffrey
Rahbar, Ahmad
Rambo, Joe & Elisa
Rampy, Larry
Rasmussen, Royce
Raths, Richard & Carmen
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Reed, Robert & Carlene
Reeder, Lisa
Reisz, Gerald
Rice, James
Ricketts, John & Lucille
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Roach, Philip
Rodriguez, Jose
Roelofs, Wendell
Roessler, William & Richardine
Rogers, Philip
Rolf, Ramon
Rosen, Irving
Ryan, Sheila & Paul
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Sattelberger, Alfred & Mary Anne
Saturday, Kathy
Sawicki, Robert & Elizabeth
Schepartz, Saul
Schilling, Beth & Jerry
Schindler, Ann
Schroeder, Robert
Schuh, Merlyn Duane & Judy

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Schwiebert, Kathryn & James
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Searle, Bernard & Norma
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Dillinger
Shiner, Vernon Jr. & Reva
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Sievert, William & Alice
Sigel, Carl
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Sojka, Stanley & Kathleen
Sondgeroth, Jason
Sorensen, Roger & Carolyn
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Stanford, Marlene
Stapleton, Patricia
Starn, Timothy
Staszewski, James & Angela Zagala
Stevens, Michael
Stewart, Richard & Jean
Stoddard, Robert
Stoelting, Daniel
Stoner, Allan
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Thieneman, Andrew Jr. & Martha
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Vickers, George
Vigna, Robert & Mary
Vincent, John & Sharon
Viola, Roger & Karen
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Wagner, Martin & Barbara
Wagner, Martin & Ching-Shu
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Bruce Diehl
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Wani, Mansukhlal & Ramila Dahl
Warfield, Timothy
Warren, Andre & Sherry
Corbitt-Warren
Watts, Daniel & Karen Bush-Watts
Weber, Charles
Welty, Willis & Catherine
Wesolowski, Dennis & Mary
Wesselman, Harold & Mary
West, Kenneth & Martha
Weymouth, Alexandra
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White, James
White, Thomas
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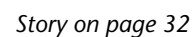
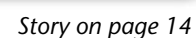
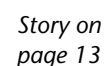
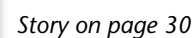
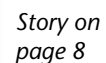
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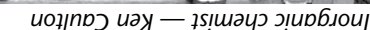
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Photography: Unless otherwise indicated, Charles Parmenter supplied the photography for this issue.



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Raymond Fleischmann

