

# The Catalyst

Department of Biochemistry

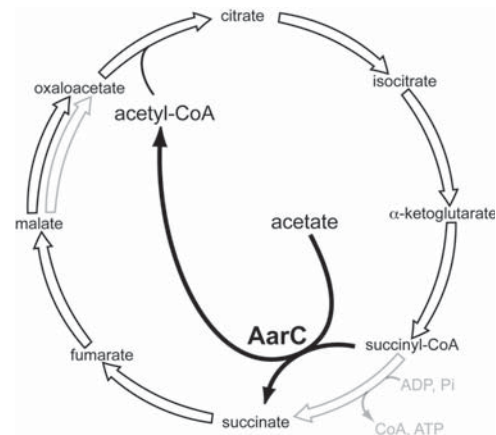
2009-2010



# Structuring a Thesis

## On the Cover

Undergraduate Kayleigh Nyffeler purifies a protein in the lab of Dr. Joe Kappock.



At an enzymes meeting in 1998, one of the gray eminences in the front row stopped the session to boom comments at the younger folks, including postdocs like me, about how the coming flood of genome sequence information would affect our careers: "This will generate 100,000 new problems for enzymologists to solve." He told us to embrace it and to ignore the gloomy forecasts from his peers that industrial-scale science would soon kill off the independent investigator.

Seven years later I was poring over a draft genome sequence of our favorite organism, a Gram-negative bacterium called *Acetobacter aceti* that converts ethanol into vinegar and as a result is able to resist huge amounts of these microbial poisons. It survives acid permeation by tolerating an acidic cytoplasm, one of its many fascinating adaptations. Having taught General Biochemistry twice, I knew I should find the genes for the main metabolic pathways. After an eye-reddening afternoon of BLAST-ing, I still could not find one important enzyme in the citric acid cycle. This lost sheep was a real 'problem,' since biochemical data said we should find succinyl-CoA synthetase (this enzyme mainly consumes succinyl-CoA to yield succinate, by the *Alice in Wonderland* logic of enzyme nomenclature). Graduate students Julie Francois and Elwood Mullins discovered that *A. aceti* contained a new enzyme, one that converts succinyl-CoA and acetate to succinate and acetyl-CoA, and that enzyme is the product of an acetic acid resistance gene with no previously known biochemical function. This meant that *A. aceti* performs the eight-electron oxidation of acetate to carbon dioxide, an unprecedented acetate disposal strategy that neatly explains the acetic acid resistance role. We published our findings in the *Journal of Bacteriology* in 2008 (<http://dx.doi.org/10.1128/JB.00405-08>), just as Elwood and I arrived at our new lab at Purdue.

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While unpacking boxes, we had that pivotal third-year conversation: what will you do for your Ph.D.? Elwood suggested we should do x-ray crystallography of his enzyme. We had used crystallography for years to pry apart the mechanisms of chemically interesting enzymes and to examine the architectures of *A. aceti*'s acid-resistant proteins. For Elwood's enzyme, I didn't see the point -- the mechanism, while interesting, was largely understood. After some badgering from Elwood, I recalled that prediction from 1998: our problem had nothing to do with the mechanism; it was that acyl-CoA hydrolase/transferase annotations don't tell you anything about substrate specificity. We had no idea what parts of the enzyme might recognize acetate or the other substrates, a glaring omission for an enzyme with a singular role in acetate metabolism and bacterial survival. We also had no clue how to find other organisms that might use complete acetate oxidation as an acid-resistance strategy using only primary sequence information. Elwood was right: we need high-resolution structure(s) of his enzyme, with ligand(s) bound, to identify those key residues. This is the essence and challenge of functional annotation, which is the only way to make biochemical sense of what has become a torrent of raw genome sequence information.

After some dalliances with a crystal form with pretty facets but ugly diffraction, Elwood solved a handful of high resolution structures of his enzyme, a satisfying endpoint for a gene whose function he explained. He did this by leveraging the considerable advantages Purdue offers in structural biology, among them a stream of sound counsel from Dr. Barbara Golden (who is an actual crystallographer, unlike me). Today Elwood has several good leads on key residues, and is doing the good, honest work of isolating mutant enzymes and measuring kinetic constants. More important, Elwood has passed an important milestone on the road to becoming an independent scientist: refuting the boss's advice with hard data.

--Joe Kappock

## Welcome...

...to the second edition of *The Catalyst* and ninth edition of our annual report. The past year was an exciting and eventful one in the Department of Biochemistry.

Elizabeth Tran, a new faculty member studying RNA processing and transport, joined the department last fall. Weiguo 'Andy' Tao was promoted to the rank of associate professor, and once again three of our undergraduates were named the outstanding students for their year among all of the students in the College of Agriculture.

Perhaps the biggest event of the past year was the celebration of our 75th anniversary on October 9 and 10, 2009. I must thank all of the students and staff who worked so hard to bring the event together... everything went off without a hitch! I also want to express my appreciation to the alumni who returned for the event. They truly made our anniversary one to remember.

So what will be the big events of the next year? First, in October five scientists will visit our department to conduct an external review of our research and teaching missions. This review is mandated by the university for all departments every five years. During their visit, the review team will evaluate our recent progress and advise us on our future plans. Preparations for their visit have been in the works for over a year, so we will be very excited to welcome the review team to our department. Second, we are initiating a full review of our graduate curriculum. With research in the life sciences proceeding at a breakneck pace and with the development of new pedagogical methods for delivering material in the classroom, we must ensure that our students are receiving the very best training in biochemistry. Our current students are playing a critical role in guiding this process and we're excited to see where the next few years will take us in this regard.

Clint Chapple  
Head, Department of Biochemistry

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# *An Evolving View of Gene Expression*

Like many other scientists, **Dr. Elizabeth Tran** believes that we are entering a new era of biological research. "Our understanding of gene expression, both in the laboratory and classroom, must be fundamentally altered to incorporate the role of RNA in gene regulation," Tran emphasized.

**What is in a gene?** In 1958, Francis Crick coined the phrase "central dogma of biology" to describe the flow of information from the genes within DNA to messenger RNA to protein. The first step of this process involves transcription of the genes into an RNA sequence by RNA polymerase. Over the past 50

years, gene expression has been thought to occur only at discrete sites at the start of genes; however, in 2007 the first report from the Encyclopedia Of DNA Elements (ENCODE) project revealed that the number of transcriptional start sites vastly dwarfed the number of protein-coding genes in the human genome. In fact, estimates suggested that over 90% of the human genome was transcribed even though less than 2% encodes 'genes.' Since this time, numerous reports have now demonstrated that widespread transcription is a general paradigm for all eukaryotes from single-celled organisms to mammals. Strikingly, most of these transcripts



do not encode proteins, but instead, have functions themselves. Many of these transcripts include well-known examples of non-coding RNAs such as transfer RNAs and ribosomal RNAs, but a large number appear to be long non-coding RNAs of unknown function.

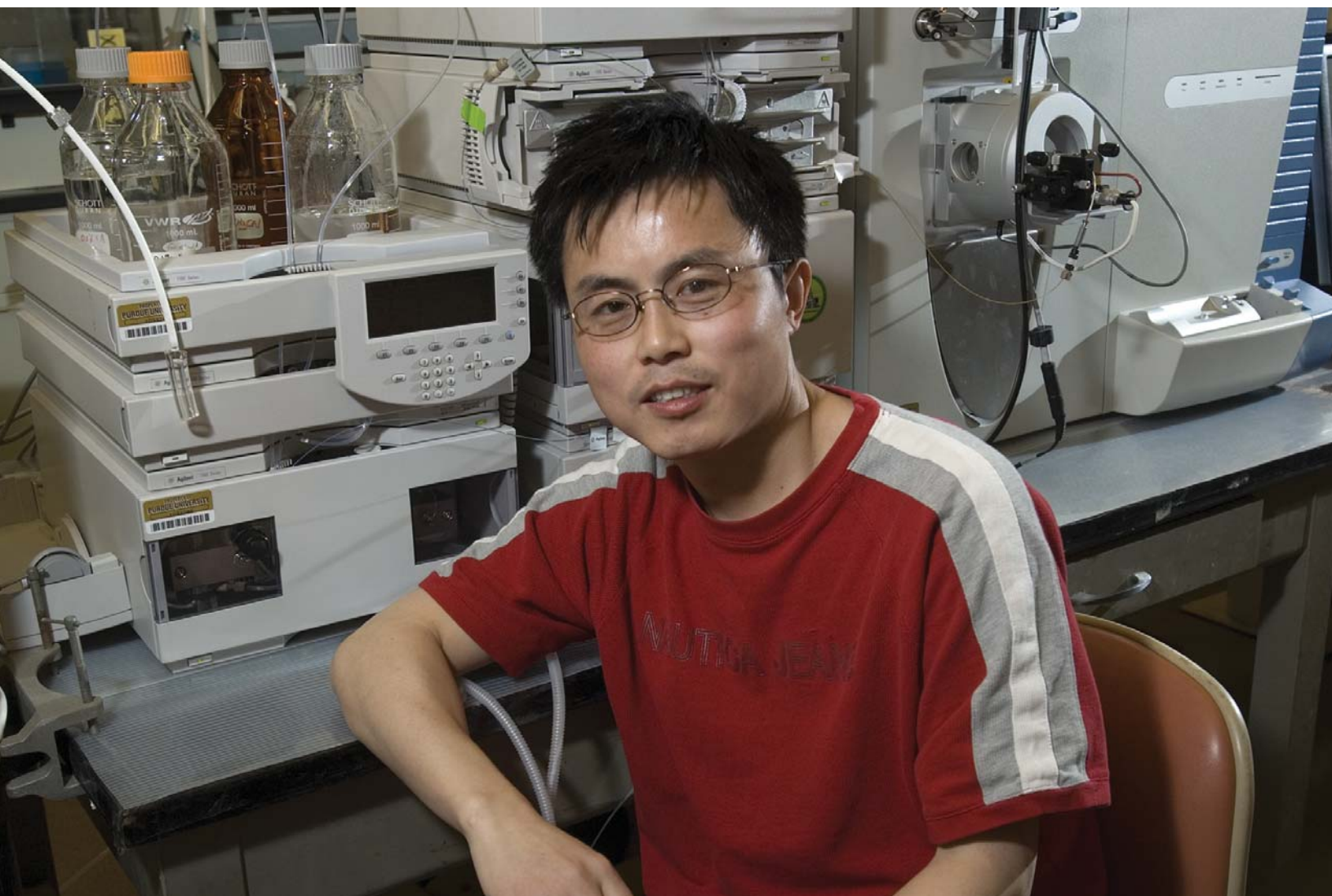
Dr. Tran joined the Department of Biochemistry in August 2009 after postdoctoral training with Professor Susan Wentz in the Department of Cell and Developmental Biology at Vanderbilt University Medical Center in Nashville, Tennessee. Tran's laboratory studies the mechanisms of RNA helicases. "Our laboratory is specifically focused on a particular group of RNA helicases DEAD-box proteins that function in every aspect of RNA biology including RNA transcription, RNA splicing, protein translation, microRNA processing, and RNA decay," she explained. "The DEAD-box RNA helicases control the formation, function and fate of most, if not all cellular RNAs." Despite their central role in RNA biology, the biochemical functions of about 40 DEAD-box proteins in humans are unknown.

"It's an RNA world," says Tran, referring to the hypothesis of Nobel Prize winner Dr. Walter Gilbert that early forms of life used RNA to both store information and catalyze enzymatic reactions, functions that by and large have been taken over now by DNA and proteins, respectively. It is becoming increasingly evident that RNAs and RNA: protein complexes perform many biological roles, including regulation of gene expression. Tran noted that the latter is clearly demonstrated by the discovery of microRNAs that regulate translation of messenger RNAs and by studies of riboswitches, RNA structures that control the expression of metabolic genes by 'sensing' metabolites.

Using the budding yeast *Saccharomyces cerevisiae* model system, Tran is uncovering the precise molecular and enzymatic function of DEAD-box proteins that regulate gene expression. "My laboratory is studying DEAD-box proteins that control the 'life cycle' of messenger RNAs." Whereas some DEAD-box proteins promote nuclear export and translation of protein coding transcripts, others appear to shut off transcription to repress gene expression, she explained. By discovering the roles of these enzymes, Tran's lab is uniquely poised to make critical insights into the roles and regulation of genome-wide transcription. "Our research is on the forefront of a rapidly expanding field. It's an exciting time to be an RNA biologist." ♦



# Moving Up



**Weiguo Andy Tao** was promoted to Associate Professor of Biochemistry effective July 2010. Tao's research is dedicated to the development of cutting edge mass spectrometry techniques that are aimed at addressing complex biological problems. A central goal of his lab is the creation of strategies to dissect cellular signaling pathways by surveying protein post-translational modifications at the level of the proteome. At present, Tao is focusing his efforts on the study of signaling involving protein phosphorylation.

Tao began his academic career in China where he earned his B.S. and M.S., both in chemistry. He moved to the U.S. in

1995 and received his Ph.D. training from R. Graham Cooks' premier mass spectrometry group at Purdue University. During his graduate career, he worked on developing methods for chiral recognition using mass spectrometry and received his diploma in 2001. Following this, Tao traveled to the Institute for Systems Biology in Seattle, Washington, to develop his expertise in proteomics under the direction of Dr. Leroy Hood and Dr. Ruedi Aebersold.

Tao joined the Department of Biochemistry in 2005. "Purdue is a perfect place to develop technologies and apply them in biological studies," he comments on his motivation to return to Purdue.

He holds courtesy appointments in the Departments of Chemistry and Medicinal Chemistry/Molecular Pharmacology at Purdue, plus holds an adjunct faculty position at the Burnham Institute for Biomedical Research in La Jolla, California. He was the recipient of a NSF CAREER Award in 2007 and in 2008 was recognized with a 3M Non-tenured Faculty Award to encourage talented new faculty to remain in academia and continue innovative research. Tao has embraced the department's goal to encourage undergraduate research by mentoring ten students in his laboratory. ♦

# Beach Family Biochemistry Lectureship

*The Beach Family Biochemistry Lectureship was established in 1990 by David W. Beach. Inspired by his son's enthusiasm for science, he chose to share his good fortune by supporting this biochemistry graduate program. This long-term support is intended to promote intellectual curiosity and an appreciation of science in all those involved.*



**Dr. Erich Nigg**, Director and Professor of Cell Biology of the Biozentrum at the University of Basel in Switzerland, presented the 2009 Beach Lecture in October. Dr. Nigg delivered two seminars, "Cell cycle control: Chromosome segregation during mitosis" and "Cell cycle control: Focus on the centrosome cycle."

Dr. Nigg was educated in Switzerland and studied life sciences at the Swiss Federal Institute of Technology (ETH) in Zurich. He completed his Ph.D. in 1980, focusing on the mobility of membrane proteins. His post-doctoral research was conducted at the University of California, San Diego, where he investigated the influence of oncogenic protein kinases on the cytoskeleton.

Subsequently, Dr. Nigg worked at several institutions throughout Switzerland, notably the ETH, the Swiss Institute for Experimental Cancer Research (ISREC) and the University of Geneva, before he joined the Max Planck Society in Germany in 1999. His studies have encompassed many fields, primarily the structure and dynamics of the nuclear envelope, the mechanisms underlying signal transduction from the plasma membrane to the cell nucleus, and the

regulation of the cell division cycle. At present, the research in his laboratory aims to elucidate the molecular mechanisms that control chromosome segregation during cell division and the centrosome duplication cycle. Disruption of these processes is widely thought to contribute to the chromosomal instability of tumor cells.

Dr. Nigg has been awarded several prizes and is an elected member of the German Academy of Sciences, the European Molecular Biology Organization (EMBO), the Academia Europaea, as well as the European Academy of Cancer Sciences.

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## Thanks for Your Input!

In May 2008 the Department of Biochemistry initiated a full review of our undergraduate curriculum, beginning with two full-day teaching retreats to review our current course offerings. This exercise covered both the courses offered by our department and service courses from other departments that are integral to our curriculum. During these discussions it became clear that curriculum revisions needed to be guided in part by feedback from our past students.

Survey results indicated what courses our alumni believe benefited them the most. We also learned that 50% of our students go on to graduate or professional schools and the remaining half follow other career paths. To address the needs of students entering the workforce in biochemistry-related fields, we also polled recruiters from several companies to learn how we could best equip our graduates to be successful.

As a result of these surveys and our own deliberations, we have revised our curriculum to include earlier biochemistry laboratory coursework,

an experimental design seminar, and a professional development seminar to increase the participation of our students in summer internship programs. Additionally, our two-semester biochemistry series was revised into a three-semester series that focuses first on molecules, then metabolism and finally macromolecular machines.

This first phase of curricular revisions began with the freshmen who entered the program in the fall of 2009. Thanks to all of you who helped to improve their experience at Purdue!

# Doing Our Part for the Cure

Cancer is a disease in which cells lose the ability to regulate division. This results in over-proliferation of cancerous cells and tumor formation. In 2006, it was estimated that over 1.5 million Americans were afflicted with progressive cancers and roughly 600,000 die each year from them. "The main challenge in developing a cure for cancer lies in the fact that cancer is not a single disease," says Dr. Timothy Ratliff, Robert Wallace Miller Director of the Purdue University Center for Cancer Research. Although unrestricted cell growth is a characteristic of all cancers, the cellular perturbations that underlie tumorigenesis and cancer progression vary from one type of cancer to another.

The Purdue University Center for Cancer Research, called the Purdue Cancer Center until 2009, is one of seven centers in the United States designated as cancer basic research centers by the National Cancer Institute. Investigators associated with the center are brought together from diverse scientific and engineering backgrounds, and are united in the common goal of elucidating how cancers arise at the cellular level. According to Ratliff, "The mission of the center is to synergistically combine the research efforts of talented people possessing different specializations to develop new solutions that will impact cancer cures."

Currently the Center for Cancer Research comprises 83 faculty members, nine of whom are faculty members in the Department of Biochemistry. "The basic research programs conducted by the center's members within the Department of Biochemistry are critical components for the achievement of our goal of creating a world without cancer," commented Ratliff. Their laboratories attack the cancer problem on multiple fronts including studies on cell cycle control and genome stability, gene expression and cancer proteomics.

Genome stability has emerged as a crucial factor in cancer avoidance. The integrity of the genome depends on the faithful replication and segregation of genomic DNA prior to cell membrane fission. In order for a cell to divide, a series of sequential macromolecular events must occur in a precise fashion to ensure that each daughter cell receives identical genetic information. This highly regulated process is known as the cell cycle. In order to divide, each cell must

synthesize a copy of its genomic DNA. Cell cycle events are strictly regulated by protein kinases and phosphatases, enzymes that attach and remove phosphate groups, respectively, from proteins. In doing so, they modify the biological function of their protein targets.

Cyclin-dependent kinases (Cdks) are responsible for triggering most of the major cell division events and have been implicated in many types of cancers. The Cdc14 phosphatase family is important both for the inactivation of Cdks and for the reversal of Cdk phosphorylation events at the end of mitosis, which is required for the proper completion of cell division and maintenance of genome stability. A collaborative effort between the labs of **Dr. Harry Charbonneau** and **Dr. Mark Hall** has led to the unexpected discovery that the Cdc14 phosphatase family actually has an intrinsic specificity for only a subset of Cdk sites. Cdc14 from humans and budding and fission yeasts shows a striking preference for phosphoserine over phosphothreonine, providing cells with a potential mechanism to control the timing of Cdk site removal during the critical late stages of mitosis, including chromosome segregation and cytokinesis that can impact genome stability.

In addition to the Cdks, Polo-like kinase 1 (Plk1) has emerged as a key player in many cell cycle-related events. Plk1 expression levels correlate well with carcinogenesis and increased Plk1 expression is observed in different human tumor types. **Dr. Xiaoqi Liu's** lab has been studying how various cell cycle events, such as DNA replication and its



*"The basic research programs conducted by the center's members within the Department of Biochemistry are critical components for the achievement of our goal of creating a world without cancer."*



subsequent segregation, are regulated by Plk1. "By examining the functions of Plk1 in cancer cell growth, we hope to determine how Plk1-associated phosphorylation activity contributes to cancer formation, thus providing novel avenues for cancer therapy," says Liu.

**Dr. Sandra Rossie** has been studying the regulation and function of serine/threonine phosphatase 5 (PP5). PP5 levels are elevated in a number of human cancers and in several transformed cell lines. According to Rossie, "Although the reason for its elevation in cancer is not known, PP5 is associated with several proteins and signaling pathways that are often activated in cancer such as the DNA damage response, mitogen activated protein kinase pathways, and cell stress responses." Rossie is currently investigating the role of PP5 in the function of heat shock protein 90, a major new target for cancer therapy. Rossie adds, "We have also found that PP5 is activated by the small G-protein Rac1, which is involved in cancer cell metastasis. We are hopeful that this work will generate new strategies to combat the spread of cancer."

Genome stability is also maintained by mechanisms that repair DNA damaged during normal cellular processes or by external influences. When DNA damage occurs, cells respond rapidly to fix their damaged genome. To help recognize where DNA damage has occurred and coordinate the necessary responses, cells mark the damage by making modifications to histones, proteins that are bound to DNA throughout the genome. If these alterations do not occur correctly, cancer can be the result. To understand how these processes

contribute to genome stability, **Dr. Ann Kirchmaier's** lab has been evaluating histone modification patterns at sites adjacent to DNA breaks at molecular resolution in individual cells in collaboration with Dr. Joseph Irudayraj's group in Purdue's Department of Agricultural and Biological Engineering. According to Kirchmaier, "This work has the potential to revolutionize our understanding of how DNA damage is repaired and how environmental and dietary factors influence the initiation and progression of cancer."

In addition to genome instability, inappropriate gene expression has been implicated in the development of cancer. Epigenetics is the process by which gene expression can heritably change without alterations in the DNA sequence and its disruption can lead to aberrant gene expression and possibly cancer. "One of the key mechanisms used to maintain and control proper epigenetic gene expression is methylation of histone lysine residues," says **Dr. Scott Briggs**, whose lab studies this process. "Histone modifying enzymes are of interest to us because many are mutated or over-produced in a variety of human cancers, indicating that they are needed for proper cell growth and differentiation. The goal of our research is to use a combination of genetic, biochemical, and molecular approaches to understand how these important enzymes function," said Briggs.

**Dr. Elizabeth Tran** studies a group of RNA helicase enzymes that control RNA-protein interactions. The Tran laboratory is currently investigating a protein known as Dbp2 using yeast as a model system. The human equivalent of Dbp2

is involved in prostate, breast and colon cancers and their resistance to cancer therapeutics; however, its precise role in cancer biology is unknown. "By defining the role of Dbp2 in gene expression, we are advancing our understanding of genetic regulatory mechanisms and providing key insights into the molecular basis for cancer development," says Tran.

Using his expertise in mass spectrometry, **Dr. Andy Tao** studies the differences in cellular signaling pathways in normal and cancerous cells by analyzing when and where phosphate groups are added to or removed from other proteins, so-called post-translational modifications, on a proteomic scale. In collaboration with Dr. Robert Geahlen in the Department of Medicinal Chemistry and Molecular Pharmacology, Tao is studying the role of spleen tyrosine kinase (Syk) in breast cancer cells. "Syk plays an unusual inhibitory role in cancer. A significant drop in its expression has been reported during breast cancer progression and, in metastatic breast cancer cells, the expression of Syk was totally lost," said Tao. Tao intends to apply his phosphoproteomic approach to profile Syk-modulated signaling pathways to gain insights into why Syk expression is eliminated in cancers.

Cancer is a challenging problem for researchers seeking a better understanding of the disease. Finding a cure will take the skills, creativity, and hard work of myriad individuals. We believe that the Purdue University Center for Cancer Research and the Department of Biochemistry will be an important part of that effort. ♦

*Last year over 1,500 people including 11 members of the Department of Biochemistry participated in the annual Take the Challenge: 5K Walk / Run sponsored by the Purdue Center for Cancer Research. The event raised over 50,000 dollars for cancer research.*



# Diverse Destinations

*The opportunity to attend university is for our students both a “door-opening” and an “eye-opening” experience. At the same time, training undergraduates who aspire to be biochemists is one of our greatest responsibilities as a department. What is truly fascinating is to see how life unfolds for students who are trained to understand the biochemical underpinnings of life. Here are a few snapshots of what our students have done with their degrees.*



**David Ott** graduated from Purdue with a B.S. in Biochemistry in 1982. After graduation, David attended graduate school at the State University of New York at Stony Brook where he earned a Ph.D. in Molecular Biology in 1987. David is now a Principle Investigator in the AIDS and Cancer Virus Program at the National Cancer Institute - Frederick, Maryland. There, he studies interactions between HIV-1 and cellular components during virus assembly.

David’s AP Biology class in high school made him realize that all of life is made up of chemical machines. “I was fascinated by this idea...,” says David, “...and I wanted to learn more. Biochemistry at Purdue seemed like a logical choice!” David credits the strong biochemistry background he received at Purdue as very helpful in his career. Working with professors like Dr. Rodwell and Dr. Brandt in the laboratory gave him confidence and prepared him for graduate school. David recalls how one day Rodwell, his academic advisor and lab research mentor, gave him the greatest advice he had yet received, “Get in the lab and see how you do: how you like it; how it likes you.” David’s most memorable moment at Purdue was going to the Biochemistry library and trying to read journals when, as he recalls, he wondered, “Are these written in English?!”



1989 was a great year for **Darla Graff** when she graduated from Purdue with an undergraduate degree in biochemistry. Among her many options, she chose to attend graduate school at the University of Colorado-Boulder in the Department of Chemistry and Biochemistry, where she earned her Ph.D. in 1995. Darla wanted to remain engaged in cutting edge science, even though jobs in the field were few at the time she earned her Ph.D. After working with patent attorneys while learning how to patent part of her dissertation research, she became convinced that was the career for her. Darla received her Juris Doctor in 2000 from the School of Law at the University of Colorado-Boulder. Since graduation, she has worked as a patent attorney in the areas of life sciences and chemistry. She says the education she received at Purdue was essential preparation for graduate school, especially the opportunity to include research in her curriculum as an undergraduate. “Purdue provided a firm foundation in life sciences, which I still draw on today,” Darla said. To Darla, the feeling of family stood out to her during her time at Purdue. The people who helped her along the way were sincere and truly cared about her success.

*“So many options are open to our students they truly have their pick of where to go and what to do.”*

*Clint Chapple, Head, Department of Biochemistry*



**Lysa Posner** earned her Bachelor of Science in Biochemistry along with the other members of the class of '88. Lysa says she has always wanted to be a veterinarian. As a child, she thought it would be fun to work with animals all day, and as she learned more, she realized the medicine and science aspect really intrigued her. Her education at Purdue gave her the fundamentals of biochemistry and physiology, but also taught her to be a thoughtful, rigorous scientist. After graduating from Purdue, Lysa earned her Doctor of Veterinary Medicine degree from Cornell University in 1992. She spent the next seven years as a private practice veterinarian before completing a Veterinary Anesthesiology Residency at Cornell in 2001. She served on the faculty at Cornell from 2001-2005 before moving to North Carolina State University's College of Veterinary Medicine, where she is currently an Associate Professor of Veterinary Anesthesiology.

Lysa still recalls having been told by one of her professors that there is no right or wrong in research -- just the truth, and that a hypothesis proven wrong is not a failure -- it is still knowledge. Her most outstanding memory of Purdue is her first research experience in the molecular biology lab. The class taught her more than just techniques for extracting DNA; it taught her how to plan, record and analyze data. In fact, she says, "I still have that bound laboratory notebook!"



**Nikki Royer** graduated from the Department of Biochemistry with her B.S. in 1992 and earned her M.S. in Animal Science from the University of Illinois. After ten years as a pharmaceutical sales representative, Nikki and her husband Scott turned their attention to owning and operating Royer Farm Fresh Beef, Lamb and Pork. Located in Vermillion County, Indiana, they raise livestock and sell meat directly to families, restaurants and grocery stores. Nikki says it was rewarding for her to return to her family's farm and combine knowledge of raising livestock with marketing to start a new business. "It was the opportunities to learn outside of the classroom that made my Purdue education even more valuable," says Nikki, "Whether working at the sheep farm, working as a teaching assistant for biology or doing research in the lab, the hands-on experience gave me the confidence to break out of my comfort zone."

Dr. Karl Brandt was one of the many influences Nikki had at Purdue who helped her along the way. In addition to his interesting class, he also served as an advisor to Nikki when she served on the Ag Student Council. Many memories stand out to Nikki from her time at Purdue -- meeting and working with her future husband at the sheep farm, failing her first exam in Biology 225 but working her way up to being a teaching assistant for the class, and last but not least, 33 cent tacos at Taco Bell!

# *A Celebration of 75 Years of Biochemistry*

The foundations were laid well over a century ago. The Office of the Indiana State Chemist was established as a part of the first fertilizer law enacted by the General Assembly of the State of Indiana in 1881. This Act required the services of a laboratory to perform the chemical analysis that would be required for fertilizer samples submitted by manufacturers. No laboratories with this capability existed in the state at that time, but Purdue University had a chemical laboratory in operation under the direction of Professor Harvey W. Wiley. Dr. Wiley was given the responsibility of administering the Act through the section stating, "The Professor of Chemistry at Purdue University is hereby constituted the State Chemist of Indiana and it shall be his duty to comply with the provision of the Act..." Dr. Wiley maintained this position until 1883 when he accepted the position of Chief Chemist in the U.S. Department of Agriculture.

Several decades later during Henry R. Kraybill's tenure as State Chemist, his office undertook a broad program of research and graduate instruction. In 1934, the laboratory and staff devoted to the teaching of Agricultural Chemistry in the Department of Agronomy became part of the newly formed Department of Agricultural Chemistry. In 1938, the entire operation moved from Ag Hall (presently Pfendler Hall) to the newly constructed Agricultural Chemistry building. When the building expanded in 1951, the name of the department changed to the Department of Biochemistry and the building became the Biochemistry building.

The Department of Biochemistry celebrated its first 75 years on October 9 and 10, 2009, by welcoming back alumni, former staff and friends from the 1950s through 2000s with participants coming from as far away as California and Hawaii. The event was held in the Biochemistry building and Pfendler Hall and offered

time for informal socializing with friends, a poster session highlighting current research, and a symposium of wonderful talks given by representatives of six of the department's eight decades of history.

The event concluded with a reception and dinner, which included the announcement that alumnus Brad Sheares (Ph.D. 1982, Carlson) and his wife Adrienne Simmons had established the annual Henry A. Moses Award in recognition of his former mentor and Purdue Department of Biochemistry alumnus (M.S 1962, Ph.D. 1964, Parker). The inaugural award was presented to Juan Martinez in recognition of an outstanding early publication as a graduate student.

It is safe to say based upon the strong turnout and feedback from those in attendance that the event was a huge success. We hope to see you at our centennial in 2034! ♦





# Biochemists for the 21<sup>st</sup> Century



Erin Kischuk



Rachel Schluttenhofer



Betheny Moore



Gabriel Rangel

*Over the years, graduates of the Department of Biochemistry have gone on to varied and prestigious careers in human and veterinary medicine, teaching and law. Some have become captains of industry, while others have focused their efforts in research. Although it is difficult to predict how each of our graduates will be successful, every year the Department of Biochemistry selects one outstanding student from each of the freshman through senior classes and nominates them for the college-level outstanding student awards. These awards are based on criteria such as academic achievements and honors, undergraduate research, extra-curricular activities, summer employment and study abroad. The following students were selected as the 2010 Outstanding Students in Biochemistry and for the second consecutive year, Department of Biochemistry undergraduates were selected as three of the four Outstanding Students in the College of Agriculture. Their successes at such a young age portend a brilliant future for all of our graduates.*

It is not uncommon for undergraduate students to change their occupational aspirations several times during their college education, and biochemistry senior **Erin Kischuk** was no exception. She comments, "I did consider several options and I never had to change my major. That's what I love about biochemistry! Biochemistry has given me such a strong background that I am well-prepared for any of the career paths I have considered. That almost makes it more difficult!" After graduating from high school in Muncie, Indiana, Erin started her post-secondary education to become a veterinarian, but she had also considered following in her mother's footsteps to become a CPA. "That's the only career I thought about that would have required a different major," she

says. But Erin's love of science won out and she continued to explore various career paths including becoming a doctor, veterinary pathologist or plant researcher, all of which were possible starting with a bachelor's degree in biochemistry.

One of Erin's outstanding achievements was breathing new life into the Biochemistry Club outreach program as a junior. As Outreach Coordinator, Erin applied for and received a \$1,500 service-learning grant to pay for supplies; she then developed ideas, contacted schools, and organized volunteers to lead science experiments with K-12 students in two local schools.

Erin's commitment to outreach is just one example of her involvement on campus and in the community that led the Department of Biochemistry to nominate her as Outstanding Senior. Erin has excelled in the classroom and has worked on undergraduate research in the College of Veterinary Medicine and in the Department of Biochemistry. She has been involved in Mortar Board, Phi Beta Kappa, the President's Leadership Class and the College of Agriculture Dean's Scholars as well as the University Honors Program. She founded "Biochem Buddies" which connected new biochemistry students with experienced ones.

Erin graduated with highest distinction in May and left for a 3-week service learning program in Romania. Upon her return, she began training with Teach for America. This program is designed to bring future leaders into low-income communities as teachers. Erin will be teaching math for two years in an inner-city Indianapolis school. She plans to attend law school following her service with Teach for America...unless she decides to become a teacher instead.

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There is no question that junior **Rachel Schluttenhofer** has a passion for serving others. This May, the Thorntown, Indiana native headed to Bolivia for her third mission trip in four years. Rachel's first trip came at age 18, when she traveled on a mission awareness trip to Guatemala. "I learned a lot on that trip. Namely, in most developing countries, you can't drink the water and you have to be careful about what you eat." When the opportunity came for a mission trip to El Salvador her freshman year, Rachel jumped at the chance. "In El Salvador, I experienced a different kind of poverty. I was torn apart by the violence and war stories our group listened to from survivors."

During the summer of 2010, after her most recent mission trip to Bolivia, Rachel studied abroad in the Dominican Republic in a program focused on Spanish and public health. "I'm interested in this field because with science and technology, many of the health issues faced in developing countries, such as access to potable water, can be resolved. I also think that there are scientific challenges in this area, such as multidrug resistant tuberculosis and vaccine accessibility that need more research and attention from developed nations."

Rachel's many service activities, in addition to her campus leadership activities and academic achievements, led to her selection as the Outstanding Junior in Biochemistry. Rachel has been active in undergraduate research since her second semester on campus. She has held summer internships through Purdue's Discovery Park and Dow

Agrosociences. Rachel is involved in the College of Agriculture Dean's Scholars, Agricultural Ambassadors, Mortar Board and the Leadership Development Certificate Program. She has served as co-coordinator of outreach for the Biochemistry Club and was recently selected as vice-president of the group for 2010-11. Rachel is not sure yet about her future plans and says, "I would love to have a job in which I can do part-time service trips to developing countries where I can combine my passions of science, languages and helping others." Rachel plans to receive her Bachelor of Science degree in May 2011 with a major in biochemistry and minors in Spanish and Biology.

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**Betheny Moore** was selected by the department as the Outstanding Sophomore in Biochemistry. Betheny says she is a person of eclectic activities and tastes... except for vegetables. "I became interested in biochemistry because of my mom. She is a high school chemistry teacher and gave atypical answers to the questions I would ask when I was young." Betheny gives one example when she was seven and asked, "Mom, how does the ice cream maker work?" Her mother replied, "Well Betheny, there are molecules of water in ice and ...[insert chemistry lesson here]." This led Betheny to become very inquisitive about how the world works. Combine that with a natural talent in math and science and voila! You have an interest in biochemistry!

From Richmond, Indiana, Betheny is following a pre-veterinary medicine plan of study. She works in the Purdue Animal Disease Diagnostic Lab, is a Presidential Scholar and has served as a member of her residence hall executive board. She is also a member of Purdue's symphonic band. She was selected recently as a co-coordinator of Biochemistry Club outreach for 2010-11. Betheny was the only Purdue undergraduate chosen for the summer 2010 Pre-Veterinary Summer Fellowship Program. She will study abroad in Ireland during the fall 2010 semester.

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Indianapolis native **Gabriel Rangel** was selected as the Department of Biochemistry's Outstanding Freshman for his academic excellence and involvement in campus and community activities. Gabe was recently selected as a co-coordinator of Biochemistry Club outreach for 2010-11. In addition, he is involved in the Purdue President's Leadership Class, Boiler Green Initiative, University Honors Lyceum learning community and FEELS (Food, Environment, Engineering and Life Science) program. The program is sponsored by the National Science Foundation, and offers scholarships and mentoring to under-represented students with aspirations to pursue STEM (science, technology, engineering and math) degrees.

One reason Gabe chose to study biochemistry at Purdue over other colleges was the opportunity to be involved in undergraduate research, which he has already started in Dr. Scott Briggs' lab in biochemistry. As a child, Gabe recalls taking all sorts of machines apart to see how they worked. "I specifically remember taking apart one of my mother's cassette tape players and finding not only all of the intriguing gears and wiring, but also a good punishment for ruining her tape player as!" While taking science classes in middle and high school, Gabe realized that biology and chemistry are about more advanced, intricate and important machinery. On his road to understanding how the different parts of an organism function together to make life happen, Gabe says he realized that while these systems are far more complicated than a tape player, they also are far more interesting. Gabe hopes, with a background in biochemistry, to have the knowledge of these complex machines required to fight, and hopefully one day, cure diseases. Gabe is interested in medical research and plans to pursue a M.D., Ph.D., or both.

# Learning Beyond the

*Continued learning outside the classroom by studying abroad, working on internships or summer research programs was no exception for our undergraduate students during the past year.*



**Heather Holzauer** (junior) studied abroad last fall at James Cook University in Townsville, Australia, taking courses in marine conservation biology and biodiversity of tropical Australia to fulfill her wildlife minor as well as two liberal arts classes. Townsville is located off the Great Barrier Reef and while she wasn't studying, she found the time to earn her open water scuba certification and began diving on the world's most protected and pristine reef. Heather loved the thrill of diving so much she quickly signed up

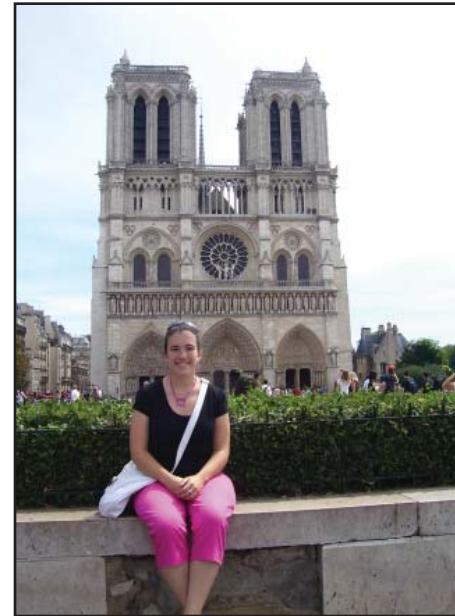
for advanced certification and dove the S.S. Yongala wreck that is located two hours off the coast and 100 feet below the surface in the swift currents of the shipping channels. Heather reported that the beauty below far exceeds that which she has seen on land and has left her waiting for the next dive. This opportunity of a lifetime, which Heather would recommend to any student, provided her with new and exciting challenges and introduced her to many other adventure-seeking travelers. Some of Heather's favorite adventures included traveling New Zealand with a friend in a campervan, sleeping at the foothills of snowcapped mountains, making friends from all over the world, walking through a tropical rainforest, rappelling down waterfalls, and sailing along the whitest beaches she has ever laid eyes on -- all on the driest continent in the world!



**Jamie Bergdall** (junior) traveled on a Maymester, 2010 study abroad experience called, "Animals, Crops, and Soils of Romania and Hungary." Throughout the trip, the group visited veterinary schools, animal hospitals and many farm operations. Jamie says it was very interesting

to see how veterinary medicine is practiced differently in another culture. One of her favorite days on the trip was when they visited an orphanage that operated a dairy operation to provide financial support. Jamie enjoyed seeing the dairy, but says interacting with the kids was something special she will always remember.

**Chelsea Noffsinger** (junior) spent two of her summer months in 2009 in France where she took general agriculture classes and studied French language and culture at Purpan University in southern France and later lived with a host family while interning for a veterinarian. "It was a wonderful learning experience and the trip of a lifetime," says Chelsea.



**Korbin Davis** (junior) worked as a Maize Product Development Intern with Pioneer Hi-Bred International's research station in Garden City, Kansas. It was his responsibility to devise and conduct an experiment studying head smut in maize. For the month of July 2009, he oversaw an inbred self-pollinating nursery and an inbred cross nursery to increase seed count for further research.

**Erin Kischuk** (senior) spent her 2009 summer in Washington, Iowa as the inaugural Soybean Product Development Intern for the Syngenta Seeds station. Erin helped with activities from planting to managing a database containing information from research trials all over the Midwest. She also had the opportunity to tour other Syngenta stations and learn about marker-assisted trait development and tour the new LEED-certified station in Minnetonka, Minnesota.





# Classroom



**Brian Zedalis** (senior) spent the summer 2009 in Whippany, New Jersey, working at Cadbury Adams USA, LLC. Cadbury is a confectionery company with products including Sour Patch Kids, Dentyne, Stride, and Trident gum, and Halls cough drops. Brian worked in their Science and Technology

Department where he tested and researched elastic properties of different flavors and brands of gum.

**Rachel Schluttenhofer** (junior) interned in Discovery R&D at Dow AgroSciences in Indianapolis, Indiana in summer 2009. She learned how to construct vectors for protein expression, induce protein expression on a large scale and purify proteins. She also worked with insect cells and fluorescence microscopy. Rachel attended intern Lunch n' Learn sessions where she learned more about the company and research.



**Megan Schnur** (junior) worked her summer 2009 as a veterinary assistant at Warrick Veterinary Clinic, a mixed animal practice in Boonville, Indiana, with veterinarians and Purdue alumni Drs. John Baker, Bryan Helms and Lynn Naylor. She began working there in August 2005 and loves

getting to experience all aspects of veterinary medicine from emergencies and surgeries to farm calls, appointments, kennels, and the clerical and business aspect. One of the most memorable moments for her was performing a blood transfusion on a severely anemic feline patient.

**Jennifer Griffith** (junior) worked for the U.S. Environmental Protection Agency in the Office of Research and Development during the 2009 summer. She earned the position through the Nels Ackerson Public Policy Fellowship Program administered by the Purdue College of Agriculture. Jennifer found it was a great opportunity to see the implications of research after it has been published. When she wasn't working, Jennifer says she had a great time exploring Washington D.C. and even had an Obama sighting.

**Leslie Seals** spent her spring 2010 semester in a beautiful coastal town in Wales studying at the University of Aberystwyth. When not distracted by the beach, she took classes in coastal environments, genetics, biochemistry, and international politics. During her breaks from school she travelled throughout Wales, England and Scotland, and also took a trip to Greece. Living in another culture was an eye-opening experience for her and she would highly recommend the program to other Purdue students.



*“Whether your thrills are seeing the wonders of the world from a new perspective or just meeting new people, study abroad appeals to everyone and IT’S ALL WORTH IT!”*

*Heather Holzauer, junior*

*“The scholarships I’ve received through the biochemistry department have allowed me to focus more on classes.”*

*Megan Schnur, junior in biochemistry*

# Making a Difference

Recall your days at Purdue University. Without doubt there were special times and special people that made your time at Purdue an experience you still remember fondly. Academics, campus clubs and organizations, internships, study abroad, sporting events, community service and other activities all contribute to the “student experience.” The focus of the Department of Biochemistry is on students. While we give students the opportunity to experience everything Purdue has to offer, the possibilities for you to help students achieve success are endless!

Whether it’s making a visit to campus to interact with students or establishing a scholarship, Biochemistry alumni are doing their part to help students succeed. One such person is David Schroeder (B.S. 1962, M.S. 1966 and Ph.D. 1968, Axelrod). Dr. Schroeder has visited campus to speak with our students and he has also endowed five scholarships at Purdue University, four of which benefit undergraduate students in the College of Agriculture. Schroeder comments on his philosophy about giving back to Purdue, “It’s not how much money you have; it’s what you do with that money that matters.” Schroeder remembers having a scholarship every year he was in school and notes, “...it’s the only way I was able to attend Purdue.” He says he established his scholarships in appreciation for what he received as a student and believes scholarships also encourage students to work hard.

Another example of student support is the Dr. Henry Moses Endowment for Biochemistry. Established by Bradley T. Sheares (Ph.D. 1982, Carlson) in honor of Henry A. Moses (M.S. 1962, Ph.D. 1964, Parker), this award is given to graduate students to recognize outstanding initial publications. Sheares explained, “Seeing your own name in print is a big deal and recognizing the student who had the best publication in a year is important.” Dr. Moses served as a mentor and professor to Sheares while he was an undergraduate at Fisk University. Sheares not only saw this endowment as an opportunity to recognize Dr. Moses as the person who mentored him and inspired him to attend Purdue, but also to recognize the significant contribution Purdue made to his own education and professional development. It is important to Sheares that he gives back to Purdue and creates opportunities for current students.

In addition to scholarship and award support, our alumni have made many other opportunities available to our students. The Beach family endowed a lectureship and fellowship as a tribute to their appreciation for science and commitment to excellence. This endowment supports an annual distinguished lectureship and provides support for graduate students to attend scientific meetings. Because of this lectureship, the Department of Biochemistry has had the privilege of hosting lecturers from all over the world,

which allows our students to learn from the best and brightest in their respective fields of research and study.

There are other areas in which support is needed and can make a difference in the “student experience.” One focus in the College of Agriculture is that students have a “transformational experience” which includes study abroad, internships and undergraduate research, among others. The Department of Biochemistry is committed to ensuring our students achieve this goal. In addition, general undergraduate research support is vital to make certain we support creative student-led research and provide flexibility to pursue projects outside the scope of a faculty member’s funded research programs.

We are tremendously appreciative of the support of our alumni and friends to sustain these important scholarships and ensuring our students succeed at Purdue. Thanks to your generosity, the Department of Biochemistry thrives in the areas of academics, research and outreach to the community. With your help we will continue to work together to support our students through scholarships and programs to prepare them for their futures.

To learn more about how you can support the Department of Biochemistry and our students, please visit our website, <http://www.biochem.purdue.edu> or call us at 765-494-1600. ♦

# College and University Scholarships

## Freshmen

**Elizabeth Baker:** Trustees Scholarship  
**Lotti Brose:** Presidential Scholarship  
**Jaclyn Hansen:** USDA Multicultural Scholar  
**Kendra Hedge:** Scholarship Award of Excellence, J. Kelly O'Neall and Margaret Ritchey O'Neall Memorial Scholarship  
**Crystal Lagemann:** Marquardt Alumni Scholarship  
**Peter Loftus:** Scholarship Award of Excellence, The Henry William and Matilda Marie Sailer Schroeder Memorial Scholarship  
**Sara McCullough:** Scholarship Award of Excellence, Presidential Scholarship, Rex Hall Scholarship, J. Kelly O'Neall and Margaret Ritchey O'Neall Memorial Scholarship  
**Kayleigh Nyffeler:** Trustees Scholarship, Marquardt Alumni Scholarship, J. Kelly O'Neall and Margaret Ritchey O'Neall Memorial Scholarship  
**Jennifer Parks:** Marquardt Alumni Scholarship  
**Gabriel Rangel:** Trustees Scholarship, Food, Environment, Engineering and Life Sciences NSF Scholarship  
**Amanda Smith:** Trustees Scholarship, Rex Hall Scholarship, Marquardt Alumni Scholarship  
**Katherine Turpen:** Scholarship Award of Excellence, J. Kelly O'Neall and Margaret Ritchey O'Neall Memorial Scholarship, Henry Andrew and Ida Sailer Wedeking Memorial Scholarship

## Sophomores

**Stacey Dahmen:** J. Kelly O'Neall and Margaret Ritchey O'Neall Memorial Scholarship  
**Laura Henry:** Presidential Scholarship  
**Daniel Martin:** Presidential Scholarship  
**Betheny Moore:** Presidential Scholarship, Rex Hall Scholarship, Fred M. Fraser Memorial Agriculture Scholarship  
**Allison Shockley:** Trustees Scholarship  
**Emily Stone:** Presidential Scholarship

## Juniors

**Jamie Bergdall:** Rex Hall Scholarship, Marquardt Alumni Scholarship  
**Michael Hans:** Rex Hall Scholarship  
**Heather Holzhauer:** Rex Hall Scholarship  
**Anna Hurlock:** Purdue Academic Success Award, Rex Hall Scholarship, Agricultural Research Fund Scholarship  
**Jason Markovich:** Lloyd and Gene Sellers Scholarship  
**Chelsea Noffsinger:** Agriculture Study Abroad Scholarship, Bratton-Brown Scholarship  
**Whitney Ringenberg:** Rex Hall Scholarship  
**Rachel Schluttenhofer:** Purdue Academic Success Award, Gruel Scholarship, Pfendler Scholars Program  
**Megan Schnur:** Rex Hall Scholarship  
**Leslie Seals:** Purdue Academic Success Award, Gruel Scholarship, Agricultural Research Fund Scholarship  
**Mary Jane Stine:** Gruel Scholarship  
**Zinan Zhou:** Rex Hall Scholarship, Agricultural Research Fund Scholarship

## Seniors

**Craig Chanley:** Rex Hall Scholarship  
**Cheng-Wei Chiang:** USDA Multicultural Scholar  
**Seunghee Choi:** Gruel Scholarship  
**Erin Kischuk:** Purdue Academic Success Award, Gruel Scholarship, Agricultural Research Fund Scholarship, John F. Benham Citizenship and Leadership Memorial Scholarship, Mauri and June Williamson Agriculture Ambassador Scholarship  
**Brittany Kraft:** Gruel Scholarship

*Below: Biochemistry College of Agriculture Scholarship recipients at the banquet with Dr. Clint Chapple.*



# Awards & Recognitions

**Dr. Jim Clemens** was selected as one of twelve Entrepreneurial Leadership Academy Fellows for 2009-10. His research has led to the development of technologies that have commercial potential. During the tenure of his fellowship, Jim was exposed to methods that can transform scientific discoveries into intellectual property portfolios that are often the foundation of new biotechnology driven companies.



**Juan Martinez** (Hall lab) was the first recipient of the Henry A. Moses Award in October 2009 for his early career publication entitled, "Acm1 is a negative regulator of the CDH1-dependent anaphase-promoting complex/cyclosome in budding yeast." (Martinez J.S., D.E. Jeong, E. Choi, B.M. Billings, M.C. Hall. *Mol. Cell Biol.* 26: 9162-9176, 2006).

**Dr. Clint Chapple** received a Seed for Success award in October 2009 for his Global Climate and Energy Project (GCEP) grant entitled, "Assembly of a Lignin Modification Toolbox." The Seed for Success award was created by the Provost and the Vice President of Research to recognize faculty members who have attracted sponsored research grants to Purdue in excess of \$1 million.

Three employees were recognized for their years of service to Purdue: **Sherry Honn**, Business Assistant (15 years), **Karyn Rodkey**, Manager of Research Services (20 years), and **Connie Bonham**, Instrument Specialist (25 years).



(l to r) Connie Bonham, Sherry Honn and Karyn Rodkey

**Jim Henderson** (Ph.D.), in collaboration with **Dr. Joe Kappock**, was a recipient of the 2010 Learning Outcomes Assessment Grant (\$1,500). The goal and purpose of this assessment project is to replace existing scantron testing with Epstein Immediate Feedback Assessment Technique (IF-AT) for biochemistry courses, which have been shown to enhance students' retention of material (Epstein, M.L., A.D. Lazarus, T.B. Calvano, K.A. Matthews, R.A. Hendel, B.B. Epstein, et al. (2002)).

Senior **Erin Kischuk** was named to the *USA TODAY*/2010 All-USA College Academic Third Team. Erin was one of two students nominated to represent Purdue University in this all-star competition. The competition was open to full-time undergraduates of at least junior standing at four-year institutions in the United States or its territories. Criteria include grades, academic rigor, leadership, activities and most important, the student's essay describing his or her most outstanding intellectual endeavor done while in college.

**Sherry Pogranichniy**, Undergraduate Program Coordinator, received a College of Agriculture Administrative/Professional Advancement for excellent performance. Sherry was hired in the main office in June 2007. She moved from rank 4 to rank 5 effective July 1, 2010.



**Anindya Chatterjee** (Rossie lab) received a Bililand Dissertation Fellowship made available by the College of Agriculture and the Purdue University Graduate School. These fellowships are awarded on a competitive basis to Ph.D. students in their final year whose research has resulted in scholarly contributions

to their respective fields, usually in the form of one or more publications or manuscripts in press.



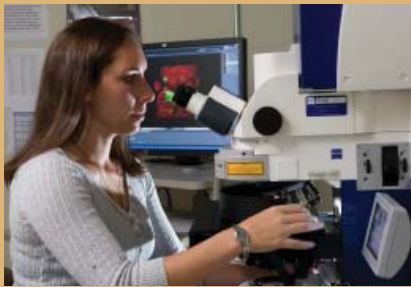
**Paul South** (Briggs lab) and **Shawn Liu** (Liu lab) were the 2010 recipients of Beach Family Travel Grants. The award supported Paul's attendance to the Federation of American Societies for Experimental

Biology (FASEB) 2010 summer research conference, Biological Methylation: from DNA to Histones, in Carfree, AZ, where he presented a poster, "A Conserved Interaction Between the SDI Domain of Bre2 and the Dpy-30 Domain of Sdc1 is Required for Histone Methylation and Gene Expression." Shawn attended the Cell Cycle meeting in May at the Cold Spring Harbor Laboratories where he presented a poster, "Plk1 Phosphorylation of GTSE1 is Essential for G2 Checkpoint Recovery."



**Dr. Scott Briggs** was selected to be a University Faculty Scholar. The program recognizes outstanding faculty who are on an accelerated path for academic distinction in the discovery and dissemination of knowledge. The appointment became effective July 1, 2010, and continues for five years. Scott will receive \$10,000 annually during the five year period for his research program.

**Jennifer Jacobi** (Kirchmaier lab) was awarded an A. H. Ismail Interdisciplinary Program Doctoral Research Travel Award for \$830 by the Purdue University Graduate School. The award helped defray the cost of her attendance at the Yeast Genetics and Molecular Biology Meeting in Vancouver, Canada, during summer 2010.



**Michelle Drennan** (Clemens lab) was selected by the department to receive a one-year Purdue Research Foundation (PRF) Research Grant. These grants are provided by the

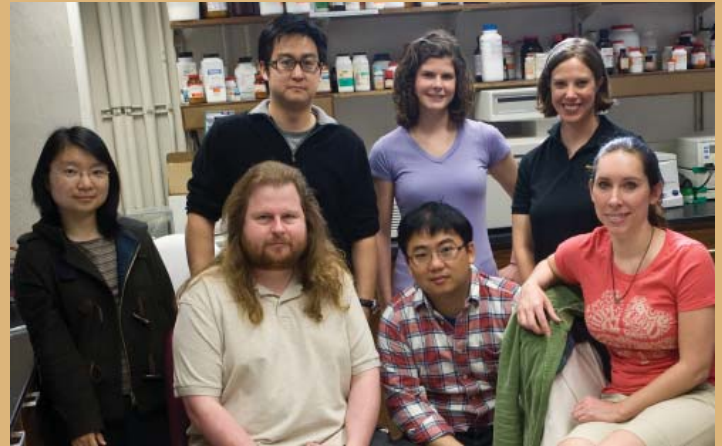
College of Agriculture in conjunction with the Office of the Vice President for Research. The award recognized Michelle's research and teaching accomplishments and will allow her to focus her efforts on the research projects that will form the basis of her doctoral dissertation.

**Jacob Galan** (Tao lab) was the 2010 recipient of the Arnold K. Balls Award for outstanding graduate student in research and the Henry A. Moses award recognizing a student for an early publication. Jacob is a 5th year student in the PULSe program. He has made significant contributions to biochemical research and the proteomics community. One of his projects is the identification of plasma biomarkers for metabolic syndrome and cardiovascular disease using Ossabaw swine as a unique animal model. Jacob is co-author on multiple publications including his first author paper, "Quantitative Analysis of Snake Venoms Using Soluble Polymer-based Isotope Labeling" (2008) *Mol. Cell Proteomics*. (4), 785-799.



Junior **Korbin Davis** was selected to be part of the Student Advisory Team for the organization Agriculture Future of America (AFA). AFA offers leadership and career development training for college students across the nation. AFA partners with rural communities, corporations, foundations, colleges, universities and individuals that support academic development, leadership development

and career development. Korbin will travel to Kansas City, MO, once monthly to meet with AFA's board of directors to promote and advance the organization. He will join eight other students in planning and creating the agenda for the 2010 conference held in November. Korbin was also accepted into the 2010-11 Purdue Discovery Research Learning Center, Cancer Prevention Internship Program where he received a \$4,500 stipend for the summer of 2010 and \$1,000 in support for the academic year for research in Dr. Liu's lab.



**Dr. Jim Clemens** was awarded the inaugural Richard L. Kohls Early Career Award for Excellence in Undergraduate Teaching, a new award created by the College of Agriculture this year. Dr. Clemens started his Purdue teaching career in 2007 and has distinguished himself as an instructor whose creative use of in-class demonstrations and analogies drawn from popular culture allow students to visualize and understand concepts at their most basic level. He is an Alfred P. Sloan Research Fellow, has participated in the KCI Entrepreneurial Leadership Academy and was selected for a National Research Service Award from the National Institutes of Health.

Undergraduates recognized as members of the 2009-10 College of Agriculture "400 Club" for their excellence in academics were freshmen **Jeff Dick, Kendra Hedge, Jing Liu, Gabe Rangel** and **Amanda Smith**; juniors **Megan Schnur, Xiwei Yan** and **Zinan Zhou**; seniors **Lu Zhang** and **Erin Kischuk**.

Senior **Courtney Hinesley** received the College of Agriculture Dean's Choice award and Senior **Lu Zhang** placed first in the life science category at the Undergraduate Research Poster Symposium in April 2010.

Several undergraduates were 2010 recipients of scholarships funded by the Department of Biochemistry. **Rachel Schluttenhofer** (junior) and **Megan Schnur** (junior) received Ray W. Fuller Memorial Scholarships. **Jennifer Griffith** (junior) received the Patrick C. Matchette Scholarship. **Heather Holzauer, Rachel Schluttenhofer** and **Megan Schnur** (juniors); **Erin Kischuk, Yang Song** and **Lu Zhang** (seniors) received Edwin T. Mertz Memorial Scholarships.

# Graduations

## Undergraduates

Nicholas Van Dongen (B.S. 2009)  
Next Stop: Quality Assurance Chemist  
Cargill, Inc., Memphis, TN

Adetola Adedokun (B.S. 2010)

Cheng-Wei "Willis" Chiang (B.S. 2010)

Seung-hee Choi (B.S. 2010)  
Next Stop: Graduate Student  
Rutgers University, Pharmacy Program

Joseph Cox (B.S. 2010)  
Next Stop: Temporary Staff  
Purdue University, Biological Sciences

Courtney Hinesley (B.S. 2010)  
Next Stop: Chemist  
AIT Laboratories, Indianapolis, IN

Erin Kischuk (B.S. 2010)  
Next Stop: Math Teacher  
Teach for America Program,  
Indianapolis, IN

Brittany Kraft (B.S. 2010)  
Next Stop: Student  
Purdue University, School of Veterinary  
Medicine D.V.M. Program

Megan Myers (B.S. 2010)  
Next Stop: Graduate Student  
Indiana University Purdue University,  
Pre-Professional Masters Degree in Biology

Benjamin Rains (B.S. 2010)  
Next Stop: Temporary Staff  
Purdue University, Biological Sciences

Yang Song (B.S. 2010)  
Next Stop: Graduate Student  
Purdue University, Department of  
Industrial and Physical Pharmacy

Amber Stroud (B.S. 2010)

Staci Walters (B.S. 2010)  
Next Stop: Laboratory Assistant  
JLM Pharmatech, Seymour, IN

Aaron Williams (B.S. 2010)  
Next Stop: Security Systems Analyst  
LBD Consulting, Valparaiso, IN

Summer Wilson (B.S. 2010)

Brian Zedalis (B.S. 2010)  
Next Stop: Graduate Student  
Georgetown University, Biochemistry/  
Biotechnology M.S. program

Lu Zhang (B.S. 2010)  
Next Stop: Graduate Student  
University of Texas Southwestern Medical  
Center, Division of Basic Sciences

## Graduates

Steve Bremmer  
Ph.D. 2009 (Charbonneau)  
Next Stop: Postdoctoral fellow  
University of Michigan  
Department of Medicinal Chemistry

Anindya Chatterjee  
Ph.D. 2010 (Rossie)  
Next Stop: Postdoctoral fellow  
Indiana University School of Medicine  
Department of Pediatrics in Indianapolis

Eunyoung Choi  
Ph.D. 2010 (Hall)

Ayesha Elias  
Ph.D. 2009 (Rossie)  
Next Stop: Postdoctoral fellow  
St. Jude Children's Research Hospital  
Chemical Biology & Therapeutics

Hemalatha Jayachandran  
Ph.D. 2010 (Rossie)

Doug Mersman  
Ph.D. 2009 (Briggs)  
Next Stop: Sales Representative  
Applied Biosystems; Division of Life  
Technologies, Lafayette, IN

Efrain Sanchez  
Ph.D. 2009 (Rossie)  
Next Stop: Postdoctoral fellow  
University of Texas Southwestern  
Medical Center at Dallas  
Department of Developmental Biology

Jing-Ke Weng  
Ph.D. 2009 (Chapple)  
Next Stop: Postdoctoral fellow  
The Salk Institute for Biological Studies

Heng Zhang  
Ph.D. 2009 (Ogas)  
Next Stop: Postdoctoral fellow  
Purdue University  
Department of Biochemistry



Above: (r to l) Cheng-Wei "Willis" Chiang, Megan Schnur, Karen Rea, Rachel Schluttenhofer and Dr. Mark Hall at Homecoming football game.

# Emeritus Passings



**Dr. Roy L. Whistler**, Emeritus Hillenbrand Distinguished Professor of Biochemistry at Purdue University, passed away on February 7, 2010, at the age of 97. Professor Whistler began his professional career at the U.S. National Bureau of Standards (1938-40), and then became Head of the Starch Structure Group of the USDA Northern Regional Research Laboratory at Peoria, IL (1940-45), before coming to Purdue University in 1946.

Professor Whistler contributed to many aspects of carbohydrate chemistry, but was best known for pioneering research on polysaccharides and for promoting their industrial applications. He foresaw the industrial potential of the guar plant, promoted it as a new commercial crop, determined the structure of the main constituent of guar gum, and was instrumental in the development of the guar gum industry. He also recognized the industrial potential of starch amylose and with Purdue Professor H.H. Kramer, a corn geneticist, developed the first high-amylose corn, now also a valuable commercial crop. He was a leading consultant to the corn-starch industry during its major development period, following the Second World War. He chaired the Crop Utilization Committee of Purdue's Agriculture Experiment Station in the 1950s and for 16 years served as chair for its Institute for Agricultural Utilization Research.

Professor Whistler was awarded 10 major national and international awards for his scientific contributions. He led the founding of the International Carbohydrate Organization, the International Carbohydrate Symposia, the International Workshop on Plant Polysaccharides, and the Division of Carbohydrate Chemistry of the American Association of Cereal Chemists. He was a past President of the American Institute of Chemists and of the American Association of Cereal Chemists, and served as a member of the Board of Directors of the American Chemical Society and on the Executive Committee of the Society of Sigma Xi. He was awarded four honorary doctorate degrees, including one from Purdue University and one from Iowa State University. The Roy L. Whistler Award, a major international award given by the International Carbohydrate Organization, is named to honor him. The premier carbohydrate research center, the Whistler Center for Carbohydrate Research at Purdue University, is also named in his honor.

Dr. Whistler was an outdoorsman and a lover of wildlife. He made numerous trips to such places as Africa, South America, Hudson Bay, Antarctica, and the foothills of the Himalayas to observe nature. In 1997, he founded the Roy Whistler Foundation to promote and support the preservation of natural land and wildlife, primarily in Tippecanoe and surrounding counties. Dr. Whistler was also a lover of intercollegiate athletics and chaired the Athletic Committee of the University Senate and was the Faculty Representative to the Big Ten Conference (1966-1977).

Dr. Whistler was preceded in death by his wife Lea. He is survived by a son, William, of Logansport and three grandchildren.

**Dr. Don M. Carlson**, former Professor and Head of Biochemistry, passed away on July 15, 2009, at the age of 78. Following high school graduation in 1949, Dr. Carlson served in the National Guard at Ft. Lewis, Washington, for two years. Dr. Carlson received his bachelor's degree from North Dakota State University in 1956, his M.S. degree from the University of Illinois in 1958 and his Ph.D. from Michigan State University in 1961. Following three years of postdoctoral research at the University of Michigan, he joined the faculty at Case Western Reserve University Medical School in the Department of Biochemistry where he rose through the ranks to Professor in 1975. From 1975 to 1981, Professor Carlson served as the Head of Biochemistry at Purdue University. In 1985 he was recruited to the position of Chair of Biochemistry at the University of California, Davis, a position he held until 1990. He retired as Professor of Biochemistry at UC Davis in 2001. In 2006 he moved to Dumfries, VA, to be closer to several of his children.

Professor Carlson was exceedingly generous in his service to scientific organizations in his areas of research interests, holding offices in the American Heart Association, American Cancer Society, the Cystic Fibrosis Foundation, the American Society for Biochemistry and Molecular Biology, and the Glycobiology Society. He served on numerous Study Sections and grant evaluation panels throughout his career and gave

high visibility to the departments with which he was associated by his service to science. He gave papers and lectures around the world on his research.

His research focused on glycoproteins. One project that was a special source of deserved pride to him was a collaboration with Professor Larry Butler during his time at Purdue in which they deciphered the effects of tannins from grain (particularly sorghum) on the digestive processes in monogastric animals. They found that tannins bind protein tenaciously and make dietary protein unavailable to the animal. Professor Carlson's particular contribution was to show that animals respond to dietary tannins by dramatically increasing the production of salivary proline-rich proteins which are particularly effective at binding the tannins, allowing other dietary proteins to be digested.

Professor Carlson is survived by his wife of 58 years, Eunice, a daughter, Lisa, three sons, Timothy, Thomas, and Mark, as well as five granddaughters, five grandsons and two sisters.



# Alumni Updates

## 1950s

**Ken Kirby** (Ph.D. 1958, Whistler) and his wife, Bernice, are still living in Cedar Rapids, Iowa. Ken continues to enjoy retirement and says, "I continue with band, choir, tennis and golf as my main activities. I follow the Boilers as much as is possible from Iowa. I really enjoyed the 75th anniversary celebration last October."

## 1960s

**Max Arens** (B.S. 1967) continued his education and received a Ph.D. in Microbiology in 1972 from Virginia Tech. He did his postdoctoral work at St. Louis University Medical School with Maurice Green at the Molecular Virology Institute and later became a member of the faculty until 1988. Max has spent the past 22 years doing research in various aspects of clinical and molecular virology at Washington University Medical School in the Department of Pediatrics where he is an Associate Professor. In June 2011, he will retire and is looking forward to spending more time with his three sons, stepdaughter, and five grandchildren as well as continuing his active bike riding, photography, backpacking, hiking, reading and traveling.

**John MacNintch** (Ph.D. 1965, Quackenbush) still lives in Old Saybrook, Connecticut, with his wife, Joan. He is currently working with a Canadian cousin in attempts to save the Little Bouctouche River, in New Brunswick, Canada, from eutrophication and pollution. John grew up on this river during his summer and winter vacations. More information about this ecological disaster in progress can be found at [www.brokenriver.ca](http://www.brokenriver.ca).

**Roger Rowell** (M.S. 1963, Ph.D. 1965, Whistler) started working for Forest Products Lab in 1968 and became a Project Leader for Carbohydrate Research. In 1980, he took a joint appointment with the University of Wisconsin as a professor in Forestry, Biological Systems Engineering and the Engineering Research Center for Plasma Aided Manufacturing. Roger retired in 2007, and is now Professor Emeritus with the University of Wisconsin and continues to direct graduate students at Wisconsin and four other universities. He also retired from the Forest Products Laboratory after 41 years as Senior Technical Pioneering Scientist. He is presently a Guest Professor for EcoBuild, Stockholm, Sweden and consults for several companies in the U.S., Europe and Asia. Roger has over 350 scientific publications, has written/edited 10 books, holds 26 patents and has given lectures in over 50 different countries.

## 1970s

**Steven Berg** (Ph.D. 1975, Krogmann) did his postdoctoral work at Wayne State University in Detroit and then became a faculty member in the Department of Biological Sciences at the University of Denver (1977-1986). In the fall of 1986, he moved to the Department of Biology at Winona State University (Winona, MN) where he served as chairperson for 8 years,

Interim Dean of the College of Science and Engineering for 2.5 years and as a faculty member until he retired in May of 2010. In retirement, Steve plans to move to his lake home in northern Minnesota and spend more time with his wife, his daughter and son and with (hopefully) some grandchildren. When he is not with family he is likely to be fishing, gardening or working in his woodshop.

**David Brink, M.D.** (B.S. 1977) is a radiologist with Radiology Associates of Dothan in Dothan, Alabama. He and Alison Brink (M.S. 1979 in Foods and Nutrition) are the parents of two boys, Andrew (26) and Matthew (21) and multiple dogs. You may contact them at [dabrink@earthlink.net](mailto:dabrink@earthlink.net).

**Charles Roesch** (B.S. 1974) continued at Purdue and received his Ph.D. in 1979 from the Department of Pharmacology and Toxicology and his M.D. from Indiana University in 1983. He has been practicing anesthesiology in Muskegon, Michigan, since 1986 with a primary clinical interest in cardiovascular pharmacology/anesthesiology. He and his wife, Terri (a cardiac surgery clinical nurse specialist), live in Muskegon right on the beach overlooking Lake Michigan. Charles is now semi-retired and enjoys his hobbies of restoration work on the USS Silversides submarine and building radio controlled airplanes.

**Christine Sekadde-Kigundu** (B.S. 1970) continued her education on a full scholarship to study clinical chemistry at the State University of New York at Buffalo and received a Ph.D. in 1974. She returned to her home country of Uganda and taught at Makerere University and then the University of Liberia, Medical School. Since 1980, she has been teaching at the University of Nairobi, Kenya, and is currently an associate professor of clinical chemistry. Christine has published extensively in the areas of reproductive health and infertility. She was married to the late Dr. John Gicheha Kigundu and has three children and two grandchildren. At the time of her graduation in 1970, Christine was on a full American scholarship called African Students' Program in American Universities (ASPAU). She comments, "I continue to feel proud that I am a graduate of Purdue University, which taught me a lot to be brave, courageous, enduring, ambitious and giving. I shall forever be indebted to the American government for giving me an opportunity to achieve my goals."

**Diane (Foye) Wiginton** (B.S. 1972) is currently a research assistant with the Cincinnati Children's Hospital Medical Center, Neonatology/Pulmonary Biology Division. She has been with CCHMC for eight years.

**Debbie Zygmunt** (B.S. 1977) continues to work at the Indianapolis Veterans Hospital and in January 2010 she enjoyed a 28-day trip to the Falkland Islands, South Georgia and Antarctica.



## 1980s

**Todd Broome** (B.S. 1983) continued on to receive his M.D. in 1987 from Marshall University School of Medicine. He completed his residency at the University of Illinois, St. Francis Hospital, Medicine/Pediatrics in 1991, and then completed a fellowship in nephrology at the University of Missouri in 1992. He is currently living and practicing in Huntsville, Alabama, as a private practice, nephrologist. Todd has four children ages 17-27.

**Jim Harwood** (Ph.D. 1982, Rodwell) has recently taken a position as Adjunct Professor in the Wake Forest University Medical School Department of Pathology where he collaborates to study metabolic diseases in non-human primates. Jim also continues to operate his consulting practice (Delphi BioMedical Consultants, LLC), teach biochemistry at the University of Rhode Island, referee soccer matches, and perform with the Colchester Chamber Orchestra (viola & classical guitar). This August Jim and his wife Jan are planning to volunteer as naturalists in New Hampshire's White Mountains National Forest.

**Michael Keith** (Ph.D. 1981, Rodwell) continues to work for the Department of Chemistry at California State Polytechnic University, Pomona. He stepped down from the chair position two years ago and reports that he is enjoying the return to teaching in the classroom.

**Peter Kennelly** (Ph.D. 1985, Rodwell) continues as the head of the Department of Biochemistry at Virginia Polytechnic Institute. In 2010, he was named chair of the Education and Professional Development Committee of the American Society for Biochemistry and Molecular Biology. Peter was also recently appointed to the editorial board of the Journal of Biological Chemistry effective July 1.

**Thomas Porter** (Ph.D. 1989, Kent) is now Director, Analytical Research and Development with Pfizer Biotherapeutics Research and Development (formerly Wyeth BioPharma). Tom has been with the organization since 1993.

**Stephanie Schroeder** (B.S. 1989) was promoted to associate professor of the Department of Biological Sciences at Webster University (St. Louis, MO) in August 2009. She also became Chair of the department in June 2009.

**Carolyn (Mint) Worby** (Ph.D. 1985, Dixon) is currently working in the Dixon lab as a research scientist at the University of California, San Diego in the Department of Pharmacology.

## 1990s

**Peter Nagy** (Ph.D. 1995, Zalkin) left the University of Iowa in February 2010 and is now an assistant professor in the Department of Pathology and Cell Biology at Columbia University Medical Center in New York City. He is working on neurodegenerative disorders caused by mutations of the RNA helicase Senataxin. He is trying to convince his youngest child,

Claudia, who is 16 years old and has grown "roots in Iowa City", that New York would be an OK place for her to finish high school.

## 2000s

**Sarah Batta** (B.S. 2008) is currently serving in the Peace Corps in Mali as a Health Education Volunteer.

**Mark Fretz** (B.S. 2001) has been working for Houghton International in Valley Forge, Pennsylvania, since 2006. He was promoted to Marketing Manager in 2008 and is currently doing international market analysis for the Houghton, which operates in over 30 countries.

**Matthew Hemm** (Ph.D. 2003, Chapple) completed his postdoctoral assignment with the National Institute of Child Health and Human Development at NIH and is now an assistant professor in the Department of Biological Sciences at Towson University in Maryland. The focus of his research is determining the prevalence and function of small proteins in *Escherichia coli* and other bacteria. Matthew and his wife, Stephanie, welcomed their second child (Phoebe) on April 29, 2010.

**Stephanie (Doun) Leimgruber** (M.S. 2004, Rodwell) is currently working at the University of Pittsburgh Drug Discovery Institute in Dr. John Lazo's lab. She and her husband, John, still enjoy living in Pittsburgh and loved cross-country skiing during the record snowfalls last winter. They welcomed an addition to their family in 2007 by adopting Linus, a now 90 pound 'mutt', from the humane society.

**Stephanie Mowery** (B.S. 2005, M.S. 2008, Forney) continued at Purdue and is currently in the Ph.D. program with the Department of Industrial and Physical Pharmacy. She is working to characterize the expression and function of intestinal and blood-brain barrier proton-dependent oligopeptide transporters which are targeted for the active transport of pharmaceutical compounds across the membranes.

**Daniel Rice** (B.S. 2001) previously reported that he was a Latin America Quality Manager with Alltech, Inc. He and his wife relocated to Maringa, Brazil, in 2007 and last November returned to the U.S. He remains with Alltech, now as a strategic analyst involved in the technical aspects of the Alltech product line and formulating new business strategies along with competitive intelligence. Dan is also currently working on a Masters in Brewing and Distilling from Heriot-Watt University in Scotland.

**Anthony Schillmiller** (B.S. 2000) received his Ph.D. in December 2005 from Michigan State University under the direction of Dr. Gregg Howe. Since that time, Anthony has been doing his postdoctoral work with Dr. Rob Last in the Department of Biochemistry at Michigan State, working on tomato trichome metabolism. He comments, "Definitely one of the highlights of the past year was seeing the work that I did in Dr. Clint

Chapple's lab as an undergraduate get published in *The Plant Journal* in December 2009! Thanks to the other Chapple lab folks (John Humphreys, Jing-Ke Weng and Jake Stout) who helped finish it up over the years!"

**Emily Sturm** (B.S. 2009) completed her first year at Indiana University School of Medicine in Terre Haute, IN. She commented, "I've found myself incredibly thankful for the science education I received at Purdue because during my undergraduate studies I was pushed to accomplish more than I thought I was able to do. I was taught how to think, problem-solve and communicate, and I was given a great scientific foundation. All these things have made this year very doable." This summer, Emily will be in Uganda on a seven-week mission trip funded in part by the Terre Haute center to work with a physician in a rural clinic.

**Autumn Sutherlin** (Ph.D. 2003, Rodwell) reported in the 08-09 version of *The Catalyst* that she would travel to Montevideo, Uruguay, during the Fall 2009 semester. She now reports of her travel, "I traveled to South America with 16 students, 10 of whom were science majors. I taught Biochemistry I and Physical Chemistry for Life Sciences (both in English) to our students

while they also took Spanish from local instructors and took courses in Latin American culture. As a group we took trips around Uruguay, to Buenos Aires, Argentina, and Foz do Iquacu, Brazil. The pre-med students were able to shadow local doctors in Montevideo and participate in a heart health awareness day. I had the opportunity to visit with graduate students at the Facultad de Ciencias. Besides trips with the whole group I was also able to travel to Ushuaia, Argentina, at the tip of South America with my colleagues and a few students during Fall Break and to Machu Picchu, Peru, with my parents at the end of the semester."

**Vivian Thieu** (Ph.D. 2004, Hutchcroft) is currently working at Eli Lilly and Company in Indianapolis, Indiana. After receiving her Ph.D., Vivian worked as a postdoc in Dr. Mark Kaplan's lab in the Department of Microbiology and Immunology at Indiana University School of Medicine working on T cells. She left Mark's lab in May 2007 and joined Eli Lilly as a Scientific Communications Associate.

**Bradley Wilson** (B.S. 2005) was married on October 24, 2009, to Indianapolis attorney, Jane Dall.



# Publications

## 2009

- Mersman, D.P., K.M. Harmeyer and **S.D. Briggs**. 2009. To be or not to be demethylated. *Cell Cycle* 8: 2135-2137.
- Plazas-Mayorca, M.D., B.M. Zee, N.L. Young, I.M. Fingerman, G. LeRoy, **S.D. Briggs** and B.A. Garcia. 2009. One-pot shotgun quantitative mass spectrometry characterization of histones. *J. Proteome Res.* 8: 5367-5374.
- Knutson, B.A., J. Oh and **S.S. Broyles**. 2009. Downregulation of vaccinia virus intermediate and late promoters by host transcription factor YY1. *J. Gen. Virol.* 90: 1592-1599.
- Schillmiller, A.L., J. Stout, J.-K. Weng, J. Humphreys, M.O. Ruegger and **C. Chapple**. 2009. Mutations in the *cinnamate 4-hydroxylase* gene impact metabolism, growth and development in Arabidopsis. *Plant J.* 60: 771-782.
- Eivers, E., L.C. Fuentealba, V. Sander, **J.C. Clemens**, L. Hartnett and E.M. De Robertis. 2009. Mad is required for wingless signaling in wing development and segment patterning in *Drosophila*. *PLoS One* 4: e6543.
- Gong, B., J.-H. Chen, P.C. Bevilacqua, **B.L. Golden** and P.R. Carey. 2009. Competition between  $\text{Co}(\text{NH}_3)_6^{3+}$  and inner sphere  $\text{Mg}^{2+}$  ions in the HDV ribozyme. *Biochemistry* 48: 11961-11970.
- Gong, B., J.-H. Chen, R. Yajima, Y. Chen, E. Chase, D.M. Chadalavada, **B.L. Golden**, P.R. Carey and P.C. Bevilacqua. 2009. Raman crystallography of RNA. *Methods* 49: 101-111.
- Shin, M.H., N. Mavila, W.-H. Wang, S. Vega Alvarez, **M.C. Hall** and O.M. Andrisani. 2009. Time-dependent activation of Phox2a by the cyclic AMP pathway modulates onset and duration of p27<sup>Kip1</sup> transcription. *Mol. Cell Biol.* 29: 4878-4890.
- Kurz, L.C., C.Z. Constantine, H. Jiang and **T.J. Kappock**. 2009. The partial substrate dethiaacetyl-coenzyme A mimics all critical carbon acid reactions in the condensation half-reaction catalyzed by *Thermoplasma acidophilum* citrate synthase. *Biochemistry* 48: 7878-7891.
- Yang, X., H. Li, Z. Zhou, W.-H. Wang, A. Deng, O. Andrisani and **X. Liu**. 2009. Plk1-mediated phosphorylation of Topors regulates p53 stability. *J. Biol. Chem.* 284: 18588-18592.
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- Yang, X., H. Li, A. Deng and **X. Liu**. 2009. Plk1 phosphorylation of Topors is involved in its degradation. *Mol. Biol. Rep.* 37: 3023-3028.
- Zhang, H. and **J. Ogas**. 2009. An epigenetic perspective on developmental regulation of seed genes. *Mol. Plant* 2: 610-627.
- Sanchez-Ortiz, E., B.K. Hahm, D.L. Armstrong and **S. Rossie**. 2009. Protein phosphatase 5 protects neurons against amyloid- $\beta$  toxicity. *J. Neurochem.* 111: 391-402.
- Long, M.C., D.A. Nagegowda, Y. Kaminaga, K.K. Ho, C.M. Kish, J. Schnepf, D. Sherman, **H. Weiner**, D. Rhodes and N. Dudareva. 2009. Involvement of snapdragon benzaldehyde dehydrogenase in benzoic acid biosynthesis. *Plant J.* 59: 256-265.

## 2010

- Du, H.-N. and **S. D. Briggs**. 2010. A nucleosome surface formed by histone H4, H2A, and H3 residues is needed for proper histone H3 Lys<sup>36</sup> methylation, histone acetylation, and repression of cryptic transcription. *J. Biol. Chem.* 285: 11704-11713.
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- Weng, J.-K. and **C. Chapple**. 2010. The origin and evolution of lignin biosynthesis. *New Phytologist* 187: 273-285.
- Li, X., N.D. Bonawitz, J.-K. Weng and **C. Chapple**. 2010. The growth reduction associated with repressed lignin biosynthesis in *Arabidopsis thaliana* is independent of flavonoids. *Plant Cell* 22: 1620-1632.
- Weng, J.-K., T. Akiyama, N.D. Bonawitz, X. Li, J. Ralph and **C. Chapple**. 2010. Convergent evolution of syringyl lignin biosynthesis via distinct pathways in the lycophyte *Selaginella* and flowering plants. *Plant Cell* 22: 1033-1045.
- Li, X., J. Bergelson and **C. Chapple**. 2010. The *ARABIDOPSIS* accession Pna-10 is a naturally occurring *sng1* deletion mutant. *Mol. Plant* 3: 91-100.
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- Weiner, H.** 2010. Chapter 10 Enzymes: Classification, Kinetics and Control in *Textbook of Biochemistry*, 7th Edition. (Thomas M. Devlin, Ed.) Wiley-Liss, New York, pp.377-424.

# Grants

**Scott Briggs**, National Institutes of Health (NIH), \$1,325,951, 01/01/2006-12/31/2010, "The role of Set1-mediated methylation in chromatin function."

**Scott Briggs**, National Institutes of Health (NIH), Stimulus supplement: \$130,840, 01/15/2010-12/31/2010, "The role of Set1-mediated methylation in chromatin function."

**Scott Briggs**, Center for Cancer Research/Purdue Research Foundation Special Incentive Research Grant (SIRG), \$16,795, 06/01/2010-05/31/2011, "Characterization of the oncoprotein ASH2L and the yeast homolog Bre2."

**Nicholas Bonawitz**, Life Sciences Research Foundation, \$162,000, 08/01/2008-07/31/2011, "BAHD acyltransferases as a means to manipulate lignin biosynthesis and optimize cellulosic bioethanol production," postdoctoral fellowship for research in the laboratory of Clint Chapple.

**Clint Chapple** (Co-PI), US Department of Energy (DOE), \$15,074,138, 08/01/2009-07/31/2014, "Center for catalytic conversion of biomass to bioenergy (C3Bio)."

**Clint Chapple**, Global Climate and Energy Project, Stanford University, \$1,930,000, 03/01/2008-02/28/2011, "Assembly of a lignin modification toolbox."

**Clint Chapple**, US Department of Energy (DOE), \$1,400,000, 09/01/2006-08/31/2010, "Manipulation of lignin biosynthesis to maximize ethanol production from Populus feedstocks."

**Clint Chapple**, US Department of Energy (DOE), \$390,000, 09/01/2007-08/31/2010, "Phenylpropanoid metabolism in *Arabidopsis*: The role of REF4."

**Harry Charbonneau and Mark Hall** (Co-PIs), Purdue University Center for Cancer Research, Innovative Center Research Pilot Projects Award, \$30,000, 06/01/2010-05/31/2011, "Regulation of cell division by the Cdc14 phosphatase."

**Jim Clemens** (Co-PI), Showalter Trust, \$75,000, 07/01/2009 - 06/30/2010, "Live imaging and computational analysis of bone morphogenetic proteins in *Drosophila* embryos."

**Jim Clemens**, Esther A. & Joseph Klingenstein Fund Inc., \$150,000, 07/01/2007-06/30/2010, "Dscam mediated control of neuronal connection specificity."

**Jim Clemens**, Indiana Clinical and Translocational Sciences Institute (CTSI), \$75,000, 05/01/2009-04/30/2010, "Identification of Ack selective inhibitors for the treatment of cancers arising from deregulated Ras signaling."

**Frederick Gimble**, PHS-NIH National Institute of General Medical Science, \$675,019, 09/01/2005- 02/28/2010, "Engineering DNA endonuclease reagents for gene targeting."

**Barbara Golden**, Case Western Reserve University/National Institutes of Health (NIH), \$40,000, 04/01/2009-01/13/2011, "Characterizing RNA-metal binding by Raman spectroscopy."

**Mark Hall**, Indiana University School of Medicine - Indiana Clinical and Translocational Sciences Institute (CTSI), \$10,000, 01/01/2010-12/31/2011, "Development of methods using SRM on a triple quadrupole mass spectrometer for rapid and sensitive detection of protein biomarkers."

**Mark Hall** (Co-PI), Discovery Park Seed Grant, \$50,000, 04/01/2009-03/31/2010, "A proteomic roadmap to the endogenous protein complexes of the endoplasmic reticulum in key plant species."

**Mark Hall**, National Science Foundation (NSF), \$586,639, 06/01/2009-05/31/2012, "Regulation of the anaphase-promoting complex by pseudosubstrate inhibition."

**Joe Kappock**, National Science Foundation (NSF), \$536,327, 07/01/2008-05/31/2010, "CAREER: Folding and function of acidophile proteins."

**Ann Kirchmaier** (Co-PI), Purdue University-University of Alabama at Birmingham (UAB) Botanicals Research Center, \$25,954, 04/01/2008-03/31/2010, "Botanicals as inhibitors of SIR2 deacetylases."

**Ann Kirchmaier**, Indiana University School of Medicine - Indiana Clinical and Translocational Sciences Institute (CTSI), \$10,000, 11/01/2009-10/31/2010, "Manipulating the fate of neural stem cells by regulating epigenetic processes."

**Ann Kirchmaier**, National Science Foundation (NSF), \$298,298, 09/01/2009-08/31/2011, "Single molecule tools for evaluating histone modifications in single living cells."

**Ann Kirchmaier** (Co-PI), National Science Foundation (NSF), \$493,000, 07/01/2007-06/30/2010, "Cell cycle inhibition of silencing in *S. cerevisiae*."

**Ann Kirchmaier**, National Science Foundation (NSF), Research Experience for Undergraduates (REU) Supplement, \$6,000, 05/17/2010-06/30/2010, "Cell cycle inhibition of silencing in *S. cerevisiae*."

**Ann Kirchmaier** (Co-PI), Purdue Office of the Vice President for Research, \$77,000, 01/01/2009-12/31/2009, "Epigenetic *in vivo* tools development."

**Ann Kirchmaier**, Purdue University Center for Cancer Research Innovative Cancer Research Pilot Project, \$30,000, 11/01/2009-12/31/2010, "Defining epigenetic programming directing double strand DNA break repair by single molecule methods."

**Xiaoqi Liu** (Co-PI), National Cancer Institute, \$369,050, 06/01/2009-05/31/2011, "Role of polo-like-kinase (Plk1) in hepatitis B virus-mediated hepatocellular carcinoma."

**Xiaoqi Liu**, National Cancer Institute, \$614,652, 08/01/2006-05/31/2010, "Functional studies of Plk1 and its interacting proteins."

**Xiaoqi Liu**, Uniting Against Lung Cancer, \$100,000, 12/01/2009-11/30/2011, "Validation on polo-like kinase (Plk1) as a therapeutic target in small cell lung cancer."

**Joe Ogas** (Co-PI), Showalter Trust, \$75,000, 07/01/2009-06/30/2010, "Role of the CHD5 chromatin remodeler in zebrafish development - a potential tumorigenesis model."

**Joe Ogas**, National Science Foundation (NSF), \$300,000, 9/1/2009-8/31/2011, "Dissecting the relationship between a CHD3 chromatin remodeler and the repressive epigenetic mark H3K27me3 in *Arabidopsis*."

**Joe Ogas**, National Science Foundation (NSF), Research Experience for Undergraduates (REU) Supplement, \$6,000, 05/17/10-08/31/11, "Dissecting the relationship between a CHD3 chromatin remodeler and the repressive epigenetic mark H3K27me3 in *Arabidopsis*."

**W. Andy Tao** (Co-PI), National Cancer Institute, \$1,611,051, 12/01/2006-11/30/2011, "Syk and associated proteins in breast cancer."

**W. Andy Tao** (Co-PI), National Institute of Food and Agriculture, US Department of Health and Human Services, \$970,300, 01/15/2010-01/14/2013, "The interactome of pathogenicity factors in the rice blast fungus *Magnaporthe oryzae*."

**W. Andy Tao**, 3M General Offices, \$45,000, 04/01/2008-3/31/2011, "3M non-tenured faculty grant."

**W. Andy Tao**, National Center for Research Resources, National Institutes of Health (NIH), \$968,680, 05/21/2009-05/20/2010, "Acquisition of a high resolution orbitrap mass spectrometer for analysis of protein modifications."

**W. Andy Tao**, National Science Foundation (NSF), \$541,593, 07/01/2007-06/30/2012, "CAREER: Soluble nanopolymers for targeted proteomics *in vitro* and in living cells."

**W. Andy Tao**, National Institutes of Health (NIH) R21 Center for Research Resources, \$560,357, 03/01/2009-02/28/2011, "Proteomic studies of dendrimer-based nanomedicines."

**W. Andy Tao**, Seattle Children's Research Institute, National Institutes of Health (NIH), \$137,250, 05/01/2009-04/30/2011, "Eukaryotic-type signaling mediates two-component regulation of GBS virulence."

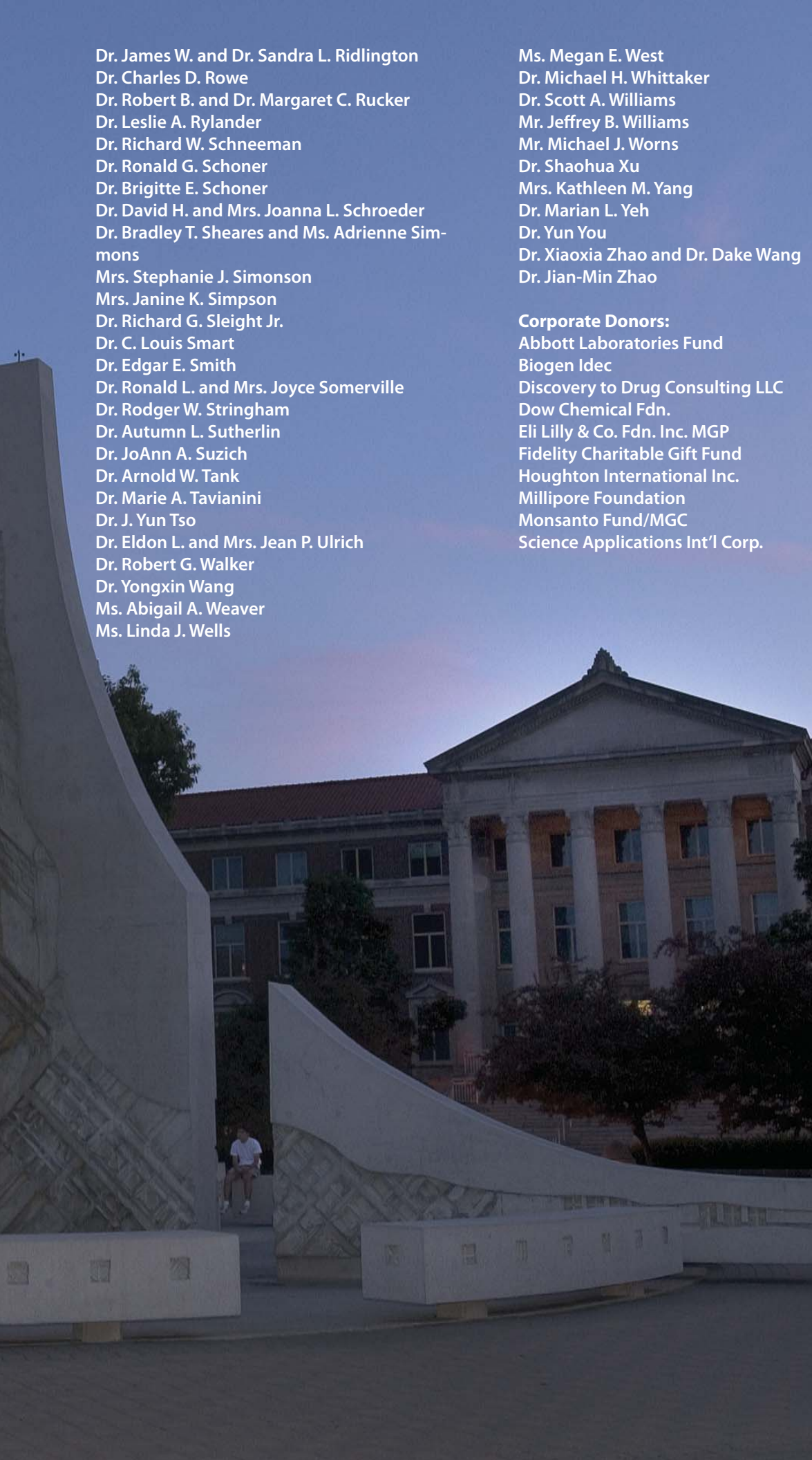
**Henry Weiner**, National Institute on Alcohol Abuse and Alcoholism, National Institute of Health (NIH), \$30,660, 04/15/2010-09/30/2010, "Enzymology and molecular biology of carbonyl metabolism XV."



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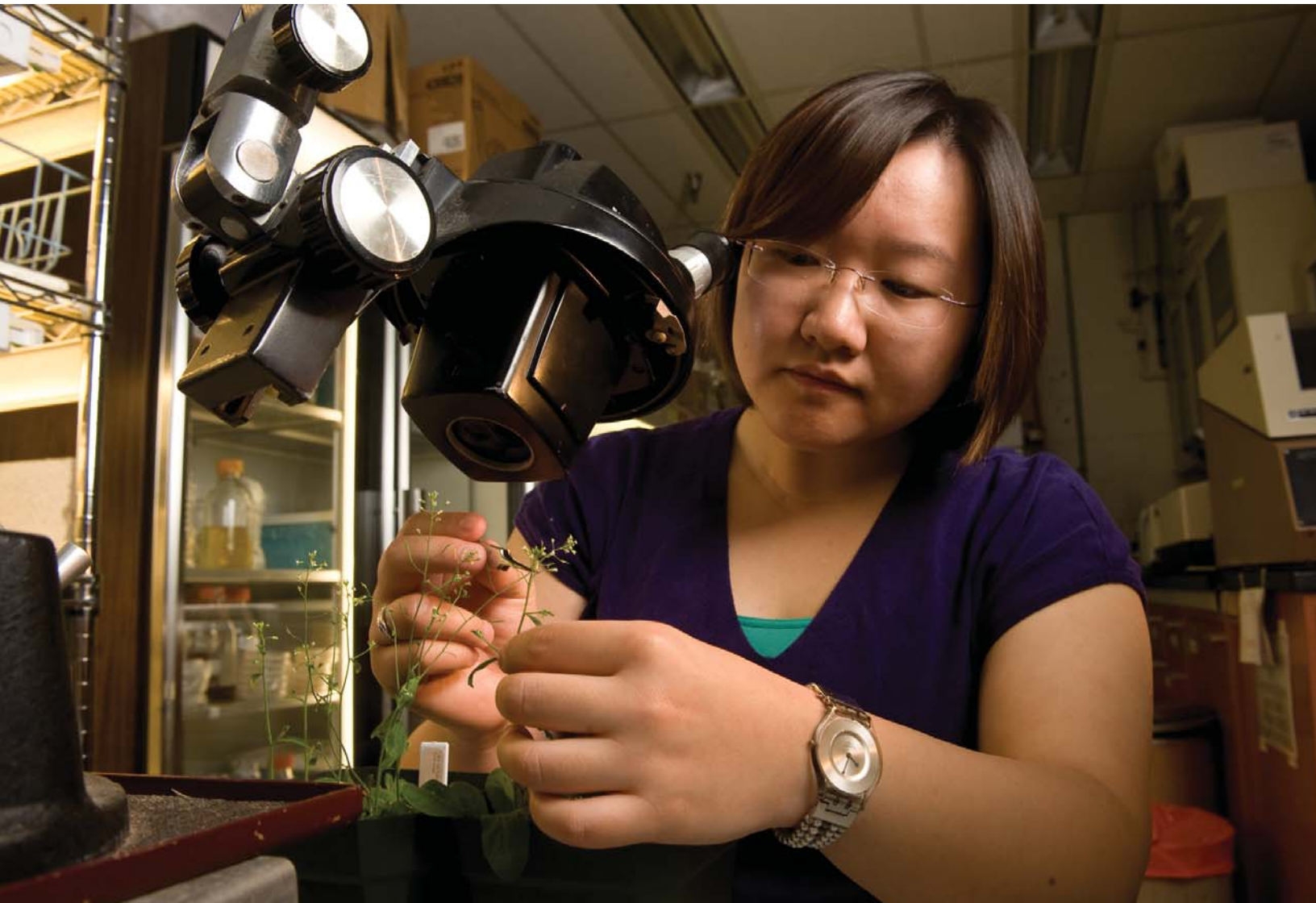
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