

# Biochemistry News

Kansas State University – Alumni and Friends Newsletter

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## TWO BIOCHEMISTRY STUDENTS RECEIVE GOLDWATER SCHOLARSHIPS

K-State News Service

Two Kansas State University Biochemistry students are recipients of 2008 Barry M. Goldwater Scholarships. The winners are **Michelle Higgins**, Manhattan, Kansas and **Scott McCall**, Parker, Colorado.

The biochemistry students are among 321 students from across the nation to receive the Goldwater Scholarship this year, which are awarded for academic merit. The scholarships are worth up to \$7,500 annually for a student's final one or two years of undergraduate studies. This year's recipients were selected from a field of 1,035 mathematics, science and engineering students who were nominated by the faculties of colleges and universities nationwide. With three Goldwater recipients this year, K-State students have now won 63 Goldwater Scholarships.

**Michelle Higgins**, a senior in nutritional sciences and biochemistry, plans to pursue a doctorate in pharmacology. Her career goal is to conduct translational research in drug discovery and development at the university level.

Higgins is working in the K-State College of Veterinary Medicine's pharmacology program, looking for proof of concept by performing immunohistochemistry on prostate tumor sections from treated mice. At K-State, she also was a student lab assistant in 2005 for the department of human nutrition, assisting in a study researching the effects of diet and exercise on cancerous tumor development. She has worked as a research technician in the K-State Nutrient Metabolism Lab, assisting in a glycemic index study investigating glucose absorption and insulin sensitivity. In 2007, she was a National Exchange Student at Oregon State University, where she gained biochemistry research credit by maintaining prostate cancer cell cultures and learning DNA extraction and Western blotting. She also had a Summer Undergraduate Research Fellowship at the University of Kansas Medical Center, where she tested pharmacologic interventions for prostate cancer. She is a member of the K-State women's rowing team, College of Human Ecology honors program, Alpha Chi Sigma professional chemistry fraternity and Phi Kappa Phi honor society and has received many other honors. A 2004 graduate of Manhattan High School, she is the daughter of Mary Higgins, Manhattan, and the late Randy Higgins.



Photo by KSU Photo Services

**Scott McCall** is a sophomore in biochemistry and biology. After earning his medical degree and doctorate in pharmacology, he would like to conduct novel pharmaceutical research, especially using synthetic medicine chemistry for clinical integration in clinical medicine. See **GOLDWATER SCHOLARS** page 2

**Telefund 2009 dates are February 17<sup>th</sup> & 18<sup>th</sup>**

## GOLDWATER SCHOLARS Continued from page 1

McCall has received the K-State Legacy Scholarship and the Gamma Sigma Delta First Year Achievement Award. Beginning in fall 2006 he worked in the organometallic lab of Stefan Kraft, assistant professor of chemistry, researching the development and synthesis of novel ligands designed to use high oxidation state palladium as a catalyst for carbon-hydrogen bond activation, with the ultimate aim of converting natural gas into combustible methanol as an alternative fuel source. He is currently working on elucidating the mechanisms of corneal cross-linking as part of surgical healing after LASIK surgery. McCall pursued that topic summer 2008 with a fellowship at the Mount Desert Island Biological Laboratory in Bar Harbor, Maine. He is a member of the K-State National Intercollegiate Rodeo Association rodeo team. In addition, he represents K-State as a Colorado ambassador. He was a National Forensics League Academic All-American in high school, and recently the American Quarter Horse Youth Association reserve national high point calf-roper, and three-time Rocky Mountain Quarter Horse Youth Association champion calf-roper. Photo by KSU Photographic Services A 2006 graduate of Cherry Creek High School, he is the son of Dr. Marc and Lori McCall, Parker, Colo.

Photo by KSU Photo Services



## TAKEMOTO RECEIVES DISTINGUISHED GRADUATE FACULTY AWARD

Dolores Takemoto, Professor of Biochemistry, has been recognized by receiving the Commerce Bank Distinguished Graduate Faculty Award; this distinction includes a \$2,500 honorarium that is supported by the William T. Kemper Foundation and the Commerce Bancshares Foundation funds. Dr. Takemoto's research has concentrated on understanding the molecular basis of sight as well as the genetic basis of diseases that affect vision. Over the years, Dr. Takemoto's research team has included 10 postdoctoral, 17 graduate and over 40 undergraduate students.

Her early studies were on cyclic GMP phosphodiesterase (cGMP-PDE); her work elucidated the central role of this protein in the signaling in visual transduction (the process that amplifies light detection ultimately leading to transmission via nerves to the brain). She showed how the interactions of the small inhibitory gamma subunit of cGMP-PDE play a key role in turning visual transduction on and off. This is mediated via direct interactions of the gamma subunit with rhodopsin and transducin proteins - two proteins that play central roles in vision. Her studies led to the identification of truncated beta subunit of cGMP-PDE as the first identified gene-bases alteration leading to retinal degeneration.

Then she turned her focus to a class of related regulatory proteins known as protein kinase C's (PKC's). She discovered that a PKC isoform, PKC gamma, is involved in the control of rhodopsin. She then went on to demonstrate that PKC gamma also controls the opening of gap junctions in both

the retina and the lens. Gap junctions are connections that allow direct transfer of molecules between cells, the only means for intracellular transfer among the internal cells of lens. She found that all lens gap junction proteins were inhibited by being modified by PKC gamma. She has worked on developing inhibitors of gap junctions in order to hinder transfer of deleterious signals (stress signals and molecules inducing apoptosis -- programmed cell death).



Photo by KSU Photo Services

In other studies on PKC isoforms, she discovered that PKC epsilon is activated under hypoxic (low oxygen) conditions, protects the outer lens epithelial cells from becoming apoptotic. This involves preventing release of cytochrome c from mitochondria. The actions of PKC epsilon help maintain normal lens morphology and opacity.

In very recent studies, Dr. Takemoto is trying to generate novel means of delivery of drugs into the eye. One of the major problems in treatment of eye diseases, such as macular degeneration or diabetic retinopathy, is successful delivery of drugs across the blood/ocular barrier. She has developed novel human albumin nanoparticles which target the endocytic uptake mechanism and these have shown success in breaching the barrier. Those studies complement her longstanding efforts to identify novel drugs to treat eye disease and to find plant-derived natural products with anti-cancer activities. The latter has used bitter melon and selected strains of wheat as source materials.

## A REALLY LUCKY YEAR Dr. Larry Davis

In December of 2007, Manhattan, along with a large swath of the mid-west, was struck by an ice storm. Many folks in town had no power for up to a week, but the university generally did OK, only closing for a day. Some unfortunate students were trying to study and take finals without heat and light. Many adjustments were made. Utility companies spent weeks pruning trees that were too close to lines. That no doubt helped us this winter.

Not too long after all the clean-up was done following the ice storm, a tornado struck, in June 2008. A large portion of the town of Chapman, west of here, was destroyed. Approximately 400 homes in Manhattan suffered significant damage. Quite a few were totally blown away or so severely damaged that they had to be removed and rebuilt. Most of the heavy damage was to the southwest portion of the city, beginning near the airport and proceeding through Miller Ranch, a new development, on through University Heights, then over the top the hill hitting Lee School, some fraternities and then the University, continuing to Bluemont Hill near the American Institute of Baking.



Durland/Fiedler Hall sustained a lot of damage, as did Ward Hall where the reactor is located. Cardwell lost a lot of windows and Weber Hall had significant damage to its roof. Burt Hall lost all but one of its surrounding trees yet had no other significant damage beyond a leak somewhere in the upper part of the roof. It was right in the line between Ward and Cardwell but the tornado hopped over the biochemists and the huge Bur Oak out front. Chalmers is about 50 yards north of the path and lost just a couple of windows.



Clean up of grounds and replacement of lost trees took several months. But we got our windows (and whole buildings) washed for the first time in living memory as part of the insurance claim. Fragments of stuff from all over were everywhere. Some things, like photos, traveled several miles. I was in New Hampshire when the tornado occurred so I missed the excitement, though not the clean-up.

Again this December, just a year after the last ice storm, we had almost identical weather conditions. Fortunately, in Manhattan we only had a very thin layer of ice form this time. It extended in a more severe form from Wamego to Kansas City and beyond. We'd rather think this is not all a result of global warming, but it does suggest more turbulence in the atmosphere.

## UNDERGRADUATE SCHOLARS FOR 2008-2009 SCHOOL YEAR:

### University Foundation / Havelly (David/Tim) Memorial Scholarship

Paul Basel  
Christopher Jones

### University Foundation / General Fund Scholarship

Derek Low  
Nathan McGraw  
Elizabeth Ploetz

### Havelly (David/Tim) Memorial Scholarship

Clay Williams

### General Fund Scholarship

Melanie Katz

### Hughes (JS) Memorial Scholarship

Jithma Abeykoon  
Christopher Jones  
Ashley Kempfort  
Andrew Kerns

### Wanda Bates Scholarship

Ryan Hill  
Melanie Katz

### Merrill (Fred/Virginia) Scholarship

John Crowl  
Spencer Leckteig  
Morgan Matile

### R. Kenneth Burkhard Scholarship for Women in Biochemistry

Jennifer Arnold  
Michelle Higgins  
Elizabeth Ploetz  
Jennifer Stegman



## 2008 MS/PHD BIOCHEMISTRY GRADUATES

**Liangyan Hu** (Ph.D., Roche) *Characterization of human pyruvate dehydrogenase kinase isoform 2 (PDHD2)*

**Jwan Ibbini** (Ph.D., Davis) *Microcosms and Field Bioremediation Studies of Perchloroethene (PCE) Contaminated Soil and Groundwater*

**Daniel Madgwick** (M.S., Takemoto) *Functional Role of CX46 in Lens Epithelial Cell Differentiation and Growth*

**Maria Nagy** (Ph.D., Zolkiewski) *Insights into the Structure and Function of the Aggregate-reactivating Molecular Chaperone CLPB*



**Emily Ragan** (Ph.D., Kanost) *Immune-related protein complexes and serpin-1 isoforms in Manduca sexta plasma*

**Suma Somasekharan** (Ph.D., Tomich) *NC-1059, a Channel Forming Peptide, Incuces a Reversible Change in Barrier Function of Epithelial Monolayers*

**Danqiong Sun** (Ph.D., Zolkiewska) *Molecular Mechanisms in Myogenesis and in Rhabdomyosarcoma*

**Matthew Warner** (M.S., Tomich) *Novel Peptide-Based Materials Assemble Into Adhesive Structures Circular Dichroism, Infrared Spectroscopy, and Transmission Electron Microscopy Studies*

## KANSAS PROGRAM HONORS BIOCHEMISTRY PROFESSOR

The Kansas IDeA Network of Biomedical Research Excellence presented faculty across the state with Faculty Scholar Awards in 2008. Among those honored with Faculty Scholar Awards from K-State was **Qize Wei**, assistant professor of biochemistry.

The purpose of the program is to acknowledge outstanding faculty whose contributions to Kansas universities are valued. Faculty members at the assistant or associate professor level with three or more years of service to the university that conduct research

in cell and developmental biology are eligible for the honor. The scholars receive an engraved plaque. Awards of \$10,000 each are made to universities with successful candidates.

The Kansas IDeA Network of Biomedical Research Excellence is funded through the National Institutes of Health Center for Research Resources for the purpose of strengthening biomedical research and training researchers in the state of Kansas.



**Dr. Qize Wei** receives Faculty Scholar Award plaque from Department Head **Dr. Michael Kanost**.

## STUDENT AWARDS AND SCHOLARSHIPS



**Debarshi Banerjee** (with D. Takemoto), **Sushanth Gudlur** (with J. Tomich), **Danqiong Sun** (with A. Zolkiewska), and **Ting Zhang** (with M. Zolkiewski), received graduate student summer 2008 stipends from the Terry C. Johnson

Center for Basic Cancer Research.

**Satyabrata Das** (graduate with D. Takemoto) received an Honorable Mention for the Alvin and RosaLee Sarachek Predoctoral Honors Fellowship in Molecular Biology. This distinction comes with a monetary award for scientific travel. He also received a Terry C. Johnson Center for Basic Cancer Research Student Travel Award.

**Alvaro Herrera** (graduate with J. Tomich) received a Philip Nordin Memorial Graduate Travel Award.

**Erin Katzfey** (Sr. with J. Tomich and Brenda Oppert) won third place for her undergraduate poster presentation, "Proteomic Analysis of Beauveria Bassiana Infection of Tenebrio Monitor."

**Kaley Morris** (Sr. in biology with J. Tomich and Brenda Oppert) won second place for her undergraduate poster presentation, "The Tribolium Gut Proteome."

**Michael Reppert** (Sr. in chemistry and biochemistry) is the recipient of the Presidential Award for Distinguished Undergraduate Student in Research. He receives \$1,000 and a plaque. The award was established to recognize outstanding individual contributions to the discovery and creation of new knowledge at K-State.

## Cancer Center Awards K-State News Service

Fifteen biochemistry undergraduate students earned cancer research awards through K-State's Terry C. Johnson Center for Basic Cancer Research in the spring of 2008. Recipients included (all were seniors unless noted): **Michelle Amthauer** (J. Tomich); **Tess Beckman**, Chemistry and Biochemistry; **Elizabeth Blaesi**, Chemistry and Biochemistry (J. Tomich); **Ariel Burns**; **Sarah Devlin**, Biochemistry and Pre Medicine; **Laura Grauer**, Biochemistry, Chemistry, and Pre Pharmacy (D. Takemoto); **Michelle Higgins**, Nutrition Science, Biochemistry, and Pre Pharmacy, **Ryan Hill**, Biochemistry and Pre Medicine (Jr., T. Roche); **Jennifer Jensen** (R. Zufferey);

**Melanie Katz**, Biochemistry and Pre Medicine (So., D. Takemoto); **Erin Katzfey**, Biochemistry and Spanish; **Sola Kim**, Biochemistry and Pre Medicine; **Jeanne Pierzynski**, **Lydia Roberts**; and **Amy Twite**, Chemistry, Microbiology, and Biochemistry.

The program was created to promote undergraduate participation in laboratory research and to encourage students to consider careers in research and medicine. The students are awarded \$1,000 stipends for conducting the research in the mentors' laboratories. Faculty mentors also received \$1,000 for research expenses.

## Tracking Alumni

**Sherry Guo** we hear that her son Mark is already in 1st grade. She traveled to India on business last spring and visited India, Thailand and Tibet on her way back to U.S.

**Jonathan Kurche** (Roche 2002), first took a short term position with the Army Medical Research Institute for Chemical Defense in Baltimore MD and then the following summer (2003) moved to University of Colorado Health Science Center in Denver joining the Medical Scientist Training Program. He has recently authored the following paper: Grazia TJ, Plenter RJ, Doan AN, Kelly BP, Weber SM, Kurche JS, Cushing SO, Gill RG, Pietra BA. Spontaneous allograft tolerance in B7-deficient mice independent of Preexisting endogenous CD4+CD25+ regulatory T-cells. *Transplantation* 83, 1449-58 (2007)

**Rose O'Cheing** (BS 2006) is in medical school at KU Med Center.

**Rich Suderman** (Ph.D 2004, Kanost) is now living in Shawnee, Kansas where he is working as a Scientist for BioMed Valley Discoveries, a for-profit company associated with the Stowers Research Institute. Rich and Jessie also have a new daughter, Sienna Gail, born March 11 of 2008. Congratulations!

**Liwen Xu**, who works in Medicine at Stanford, has a daughter Kexin studying at Tufts University in Boston. Her younger daughter, born in Manhattan, is now a 7th grader.



**Yu Xi Gong** (center) receives a retirement gift for her service to Biochemistry from **Dr. Om Prakash** (left) and **Dr. Michael Kanost** (right)

**Yu Xi Gong** is recognized for 20 years of service at Kansas State University, including 19 years with the Department of Biochemistry.

Gong began in the Department of Foods and Nutrition in 1987 and then moved to the Department of Biochemistry to work as a research assistant in the laboratory of Dr. Ramaswamy Krishnamoorthi from 1988 to 1999. Gong initially worked on the isolation and purification of protein inhibitors of trypsin from pumpkin seeds, which were needed for NMR studies relating to control of blood coagulation. A careful and dedicated experimentalist, Gong discovered a new trypsin inhibitor during the course of this work. She enthusiastically learned NMR spectroscopic techniques on her own, and started working with others in the lab on the NMR structure determination of proteins. Gong readily helped co-workers, with a pleasant personality, and she contributed to a number of protein NMR papers published by the laboratory.

She later worked with Dr. Om Prakash in the Nuclear Magnetic Resonance core laboratory, assisting many students and faculty members with NMR experiments as part of their biochemical research. She played a major role in establishing the upgraded biomolecular NMR laboratory in Chalmers Hall. In her work in the NMR facility she trained many undergraduate and graduate students with NMR methodology through assisting with the NMR Laboratory Course (BIOCH757), and she coauthored numerous research publications in international journals.

Her friends and colleagues provide this citation in appreciation of Yu Xi Gong's excellent service to the Department of Biochemistry and Kansas State University and to express our respect for her ability and energy on behalf of so many contributions to increase NMR research activity, training and education at this university.

## 2008 BS/BA BIOCHEMISTRY GRADUATES

Lydia Barrigan (BS)

Collin Cooper (BS)

Erin Katzfey (BS)

Astyn Miller (BS)

Tess Beckman (BS)

Sarah Devlin (BS)

Sola Kim (BA)

Brian Ransome (BS)

Ariel Burns (BS)

Laura Grauer (BS)

Elizabeth Matile (BA)

Amy Twite (BS)

## HAGEMAN DISTINGUISHED LECTURER: DR. DALE BAUMAN

Dale E. Bauman, a native of Michigan attended Michigan State University. Beginning from a dairy farm in Brown City, and a 4-H scholarship to MSU, he has become one of the world's most cited agricultural scientists. His abiding interest has been in dairy cattle and he has made several major contributions to our fundamental understanding of the lactation process. As one award citation in the early 1980s noted, his work "played a major role in establishing the morphological, hormonal and biochemical changes that occur in the dairy cow... as she goes from a non-lactating to a lactating state."



Professor Bauman obtained his PhD in Dairy Science from the University of Illinois in 1969 in the same department where Elizabeth Hageman worked for a number years. He remained there for a decade, then moved to Cornell University. His PhD work was on fatty acid synthesis in the mammary gland and his recent work has shown what are some specific dietary factors that control such synthesis at the level of gene regulation (Nutrigenomics).

While at Illinois he developed techniques for hormonal injection to induce lactation in both cows and heifers. Further refinement of our understanding of the hormonal response system ultimately resulted in the development of bovine somatostatin as a tool to enhance milk production by prolonging the life of mammary cells. This has opened whole new fields and also generated significant controversy. A recent publication of his documents the beneficial "carbon footprint" effects of BST use.

Recent research in Professor Bauman's lab has been directed toward "functional foods"- using milk to deliver beneficial fatty acids, such as conjugated oleic acid into the human diet. He has also explored the impact of altered rumen fermentation processes on milkfat production. The subject of the 2008 Hageman lecture was *Regulation of Fat Synthesis: Nutrigenomics and the Low-Fat Milk Syndrome*.

In 1988 Dr. Bauman was elected to the National Academy of Sciences. From 1990 to 1994 he served on the Board and from 1994-1997 he was chair of the Board on Agriculture and Natural Resources, of that organization. Several important reports were prepared during his tenure there. Professor Bauman has received numerous awards and honors from professional scientific societies, beginning while he was a graduate student at MSU. He has received the Alexander von Humboldt award for research "considered of greatest significance to U.S. agriculture," and the United States Department of Agriculture Superior Service Award. He served as president of the American Society of Nutritional Sciences, and just this year received their Dannon Institute award for mentoring of the next generation of researchers.

The 2008 colloquium was titled *Bioactive Fatty Acids in Milk Fat: Are all trans Fatty Acids the Same?* It focused on a new area in understanding of milk- the bioactive fatty acids, food for the next generation of researchers.



We had an excellent turnout for both sessions. There was a lot of interest from other departments including Human Nutrition and Animal Science.

**Telefund 2009 dates are February 17<sup>th</sup> & 18<sup>th</sup>**

Dear alumni and friends,

We hope you will keep in touch with us and your former classmates by contributing to our newsletter. Would you please take a minute to send us your news about you, your career, and your family?

The Department of Biochemistry would also like to thank you for your generous support. Your donations allow us to offer scholarships, improving our ability to recruit and retain outstanding and deserving students. General funds supplement the department's operating budget to enhance the quality of education and research experiences we can provide to our students and to attract and support new faculty.

As you're no doubt aware, this has been a hard year for endowments at colleges and universities all over the country. Many endowed scholarships are "under water" and will not be helping support students. So this year your support is especially important.

If you wish to donate to any of the Biochemistry Foundation funds (see below) please send your contribution to the Department of Biochemistry and indicate which fund you wish to support. Please call us at 785-532-6121 or email [biochem@ksu.edu](mailto:biochem@ksu.edu) if you have any questions.

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## **Biochemistry Foundation Funds**

- F17870**      **Biochemistry General Fund Account**
- F66998**      **Hageman (Richard/Elizabeth) Distinguished Lectureship**  
Annual Hageman Lecture Series
- F68342**      **Havley (David/Tim) Biochemistry Discretionary Account**  
Undergraduate Scholarships
- Q53097**      **Hedgcoth Biochemistry Graduate Scholarship Account**  
Outstanding Graduate Teaching and Graduate Research Awards  
Graduate Student Travel to Scientific Meetings
- Q71700**      **Hughes (J.S.) Memorial Scholarship Account**  
Undergraduate Scholarships
- F79431**      **Merrill (Fred/Virginia) Biochemistry Discretionary Account**  
Undergraduate Scholarships
- Q03227**      **Wanda Bates Undergraduate Scholarship Account**  
Undergraduate scholarships for students with financial need
- N85330**      **Willard & Ora M. Ruliffson Memorial Scholarship Account**  
Scholarship for pre-dentistry or pre-veterinary students
- F81556**      **Philip Nordin Memorial**  
Awards for Graduate Student Research Travel
- F51745**      **W. Mack Barlow Memorial Scholarship**
- Q55486**      **R. Kenneth Burkhard Scholarship for Women in Biochemistry**  
Scholarship for Outstanding Female Biochemistry Juniors and Seniors



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### **KSU Biochemistry on the World Wide Web**

<http://www.k-state.edu/bchem/>

Our homepage contains information on the Department of Biochemistry, faculty, undergraduate and graduate programs, courses, seminar, and core facilities. Other K-State related pages that might be of interest:

KSU Alumni Foundation <http://www.k-state.com>

E-Collegian Newspaper <http://www.spub.ksu.edu>