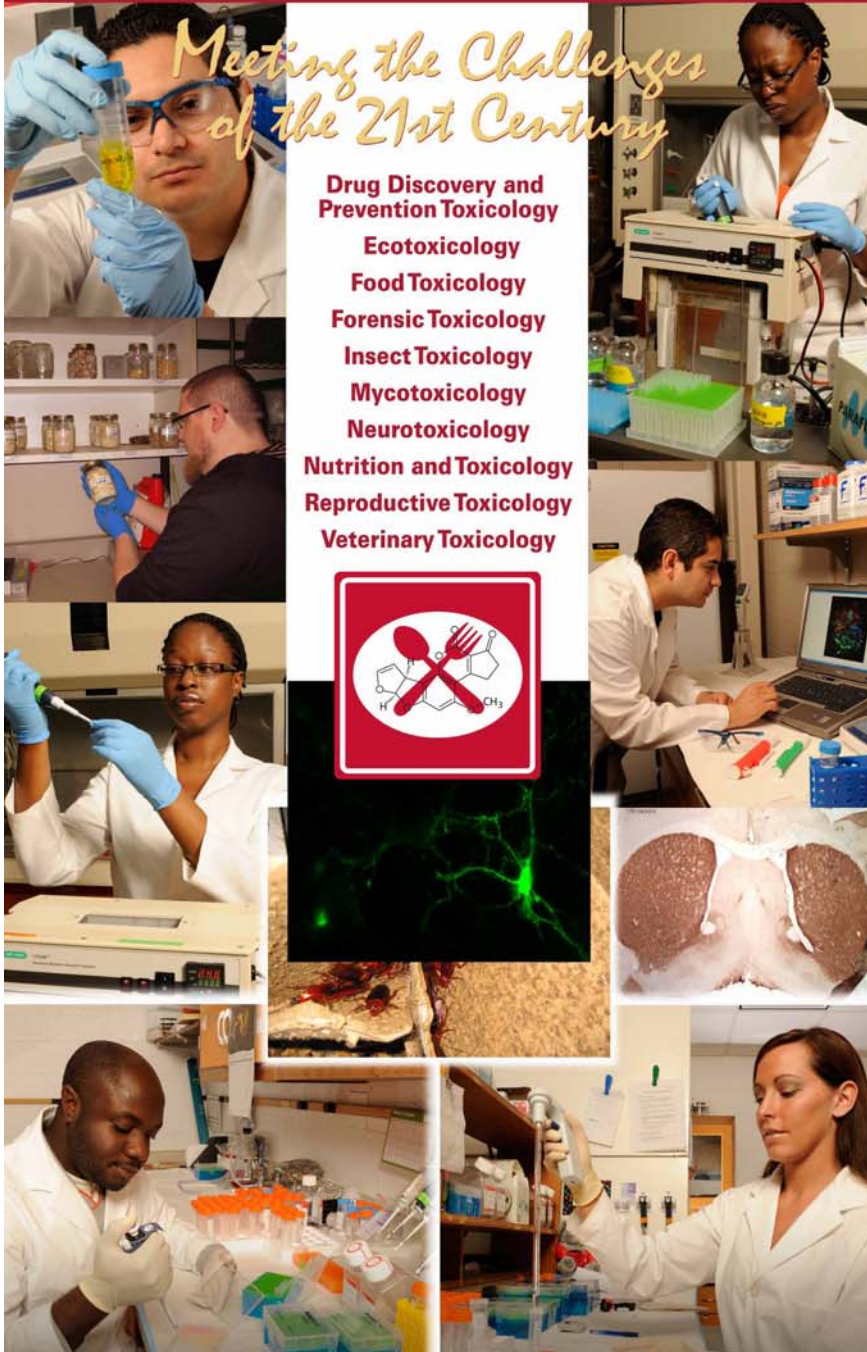













GRADUATE PROGRAM IN TOXICOLOGY IOWA STATE UNIVERSITY

Meeting the Challenges of the 21st Century

- Drug Discovery and Prevention Toxicology
- Ecotoxicology
- Food Toxicology
- Forensic Toxicology
- Insect Toxicology
- Mycotoxigenology
- Neurotoxicology
- Nutrition and Toxicology
- Reproductive Toxicology
- Veterinary Toxicology



GYT  **TOXIC**  **LOG**  **GYT** 
TOXIC  **LOG**  **GYT**  **TOXIC** 
COLOGY  **TOXIC**  **LOG** 

www.toxicology.iastate.edu

Greetings!

The Toxicology Program at Iowa State University has been busy this past school year. We welcomed five new students and a new faculty member. Four students graduated and two long-time toxicology faculty retired. We had a robust seminar series and developed a banner to take on recruitment trips. Our students attended national and international conferences and had time for personal interests and pursuits.

Interdepartmental Toxicology

www.toxicology.iastate.edu

Toxmajor@iastate.edu

Chair: Anumantha Kanthasamy, Biomedical Sciences.

Supervisory Committee Members:

Joel Coats, Entomology
Arthi Kanthasamy, Biomedical Sciences
Aileen Keating, Animal Science
Dusan Palic, Biomedical Sciences

Program Coordinator:
Linda Wild

Recruitment Fall 2010 and Spring 2011

Five new students were recruited for Fall 2010 and Spring 2011. These students joined the labs of **Aileen Keating**, Animal Science; **Anumantha Kanthasamy**, Biomedical Sciences; **Jacek Koziel**, Ag & Biosystems Engineering; and **Qijing Zhang**, Veterinary Microbiology and Preventive Medicine.

Recruitment Fall 2011.

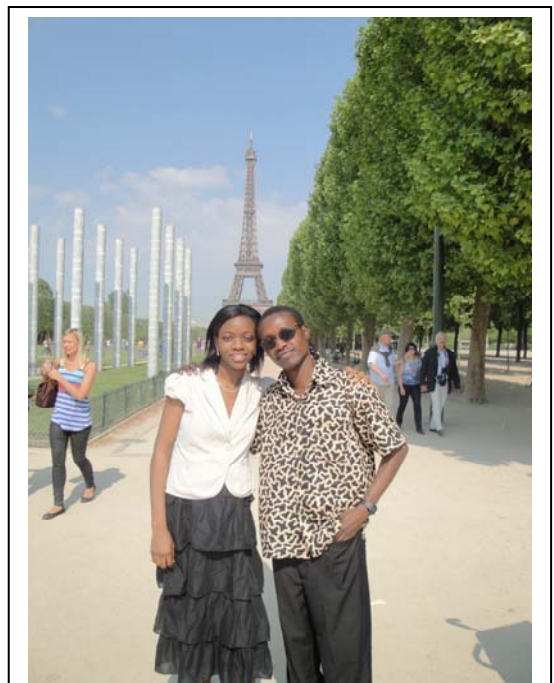
Three new students are recruited for Fall 2011, 2 domestic and 1 international student. The students completed BS degrees at Penn State, U of Minnesota-Duluth, and University of Wisconsin-Parkside. All three students will participate in rotations with toxicology faculty during the 2011-2012 school year.

Graduation

Hariharan Saminathan, Biomedical Sciences, completed his Ph.D. this year with Dr. **Anumantha Kanthasamy**. He is a Scientist at the In Vitro ADMET Laboratories/A P Sciences at Columbia, Maryland. **Shecoya White**, Food Sciences and Human Nutrition, completed her Ph.D. this summer with **Aubrey Mendonca**. Also planning to graduate this summer are **Zhiyi Qiang**, Ph.D., Food Sciences and Human Nutrition, **Suzanne Hendrich** lab; and **Boris Jovanovic**, Ph.D., Biomedical Sciences, **Dusan Palic** lab. Tong Fan completed a Ph.D. in the Fall of 2010 with **Joel Coats**, Entomology. Tong is a post-doctoral research associate at the University of Florida at the Emerging Pathogens Institute in Gainesville, Florida. **Wenda Zhu** completed an M.S. degree with **Jacek Koziel**, Agricultural and Biosystems Engineering. **Aaron Gross** completed an M.S. degree with **Joel Coats**, Entomology and is now continuing on for his Ph.D. with Dr. **Coats**. **Ashley Jessick** completed an MS. with Dr. **Coats** and is now pursuing a Ph.D. in Toxicology at the University of Nebraska Medical Center in Omaha, Nebraska.

Toxicology Students doing interesting things

Samuel Buxton, a Ph.D. student in the **Richard Martin** Lab in Biomedical Sciences won a [Chateaubriand Fellowship](#) from the French Embassy in United States to do research in France for approximately 6 months during early 2011. The Chateaubriand Fellowship is a grant offered by the Embassy of France in the United States. Every year, it allows doctorate students enrolled in American universities to conduct research in France for up to 9 months. Chateaubriand recipients receive a stipend, a round trip ticket to France and health insurance. The Chateaubriand Fellowship is highly competitive and the awarding of the fellowships is very selective. Samuel attended several conferences this past year including the national SOT conference (Effect of the cyclooctadepsi-peptide, emodepside, on voltage-activated currents in *Ascaris suum*. **Buxton, S.K., Robertson, A. P., Holden-Dye, L. & Martin, R.J.**) in Salt Lake City, Utah. He presented "Ascaris suum SLO-1 channel, a target for the anthelmintic emodepside." (**Buxton, S.K., Neveu, C., Charvet, C.L, Robertson, A.P & Martin, R.J.**) at Journées d'Animation Scientifique du Département de Santé Animale in Fréjus Cedex, France. He will give an oral presentations, "Ascaris suum SLO-1, is it a target for the anthelmintic emodepside?" (**Buxton,**



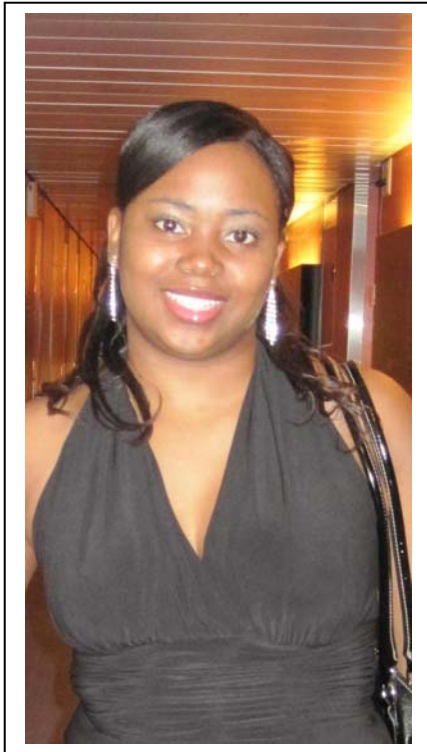
S.K., Neveu, C., Charvet, C.L, Robertson, A.P & Martin, R.J.) and at the 23rd International Conference of the World Association for the Advancement of Veterinary Parasitology (WAAVP), Buenos Aires, Argentina. He will give an oral presentation “Levamisole-sensitive AChR of *Oesophagostomum dentatum*: molecular & electrophysiological characterization” (**Buxton, S.K.**, Charvet, C.L, Neveu, C., Peineau, N., Cabaret, J., Robertson, A.P & Martin, R.J.) at the 2011 Consortium on Anthelmintic Resistance SNPs (CARS) Satellite Meeting, 23rd WAAVP, Buenos Aires, Argentina. Recent publication: **S K Buxton**, C Neveu, C L Charvet, A P Robertson, R J Martin (2011). On the mode of action of emodepside: Effects on membrane potential and voltage-activated currents in *Ascaris suum*. *British Journal of Pharmacology*, [in press].

Boris Jovanovic, a Ph.D. student in the **Dusan Palic** Lab, Biomedical Sciences, has been equally busy this year. He received the Iowa State University Graduate College 2011 Teaching Excellence Award, the Iowa State University Graduate Student Organization 2011 Outstanding Teaching Award, and was honored as a Preparing Future Faculty Scholar and Fellow. He was awarded Best Elsevier poster presentation award at **2010** SETAC annual Meeting. He was the 2010 Aquatic Nanotoxicology session chair at the SETAC North America 31st annual Meeting, Bridging Science with Communities, Portland Oregon, held November 7-11. He received a 2011 Smithsonian Tropical Research Institute, Republic of Panama, Fellowship for his scientific research project, „Effect of Titanium Dioxide (TiO₂) Nano-particles on Coral Bleaching, Stress Responses and Immune Gene Expression”. In addition to national and regional SETAC chapter presentations, Boris presented at the 2010, 14th International Congress of Immunology, Kobe, Japan, August 22-27th: “Nanoparticle immunotoxicity in fish neutrophils.” **Jovanović B.**, Anastasova L, & Palić, D.

Recent publications include: **Jovanović, B.**, Baran, E., Goetz, F.W. & Palić, D. (**In press**). Effects of different lipopolysaccharide preparations on neutrophil function in the fathead minnow (*Pimephales promelas* Rafinesque, 1820). *Journal of fish diseases*. Živković, D. & **Jovanović, B.** (**In press**). Spatial morphometric plasticity of spirulin *Alburnoides bipunctatus* (Bloch, 1782) phenotype from the Nišava River, Serbia, Danube basin. *Biologica Nyssana*. **Jovanović, B.**, Ji, T. & Palić, D. (**In press**). Gene expression of zebrafish embryos



exposed to titanium dioxide nanoparticles and hydroxylated fullerenes. *Environmental Toxicology and Safety*. **Jovanović, B.**, Anastasova, L., Rowe, E & Palić, D. (**2011**). Effects of nanosized titanium dioxide on innate immune system of fathead minnow (*Pimephales promelas* Rafinesque, 1820). *Environmental Toxicology and Safety* **74**, 675-683. **Jovanović, B.**, Goetz, F.W., Goetz, G.W. & Palić, D. (**2011**). Different immunological stimuli change expression of genes in fathead minnow (*Pimephales promelas* Rafinesque, 1820). *Journal of Fish Biology* **78** (4), 1054-1072. **Jovanović, B.**, Anastasova, L., Rowe, E & Palić, D. (**2011**). Hydroxylated fullerenes inhibit neutrophil function in fathead minnow (*Pimephales promelas* Rafinesque, 1820). *Aquatic Toxicology* **101**, 474-482. <http://www.theborisjovanovic.com/>



Shecoya White, Ph.D. Toxicology, Summer 2011, Mendonca Lab, Food Science and Human Nutrition gave several presentations during the last school year. She presented at the International Association for Food Protection (IAFP) Annual Meeting, 2010, Anaheim, California: "Antimicrobial Efficacy of Phosvitin Alone or Combined with Nisin against *Listeria monocytogenes* in a Laboratory Broth Medium at 35° C" (White, S., Mendonca, A., Daraba, A., and Ahn, D) and "Influence of Nisin or Selective Meat Additives on the Antimicrobial Effectiveness of Ovotransferrin against *Listeria monocytogenes*" (Mendonca, A., Moon, S. H., Daraba, A., White, S., Paik, H. and Ahn, D). Shecoya presented at the Institute of Food Technologists (IFT) Annual Conference, 2011, New Orleans, Louisiana: "Antimicrobial efficacy of phosvitin, nisin, and combinations against *Salmonella enterica* in a laboratory medium and a commercial-type soup," (White, S., Mendonca, A., Daraba, A., and Ahn, D.). This month, Shecoya will present at the International Association for Food Protection (IAFP) Annual Meeting, July 2011, Milwaukee, Wisconsin: "Control of *Salmonella enterica* and *Staphylococcus aureus* in a laboratory medium and a commercial-type soup using

phosvitin, carvacrol, or combinations," (White, S., Mendonca, A., Daraba, A., and Ahn, D.) Her publications this year include: S. H. Moon, H.-D. Paik, S. White, A. Daraba, A. F. Mendonca, and D. U. Ahn. "Influence of nisin and selected meat additives on the antimicrobial effect of ovotransferrin against *Listeria monocytogenes*." 2011. Poultry Science. [In Press]. This summer she is the Program Coordinator for the George Washington Carver Summer Internship Program run by the College of Agriculture and Life Sciences at Iowa State University.



Blue view of Hach Hall is a winner. This interesting look at the Hach Hall entryway (new Chemistry building across the street, south of the Molecular Biology Building) earned university photographer Bob Elbert first place in a national contest sponsored by the University Photographers' Association of America. Elbert's photo makes creative use of Seattle-based artist Norie Sato's sculpture "Elemental." The large sculpture, inspired by patterns in elements and molecular models, consists of glass, aluminum and LED lights in multiple panels. It can be viewed from inside or outside the northwest area of Hach Hall. What you see:

The photo above, taken in October of 2010, shows two students just outside the Hach entryway. Reflections of the students as well as the Hach interior make up the right half of the photo. Elbert's photo garnered the top spot in the "campus environment" division of the UPAA's annual competition.

2010-2011 Toxicology Seminars

Shecoya White, Food Sciences and Human Nutrition, **Mendonca Lab**, Title: "Antibacterial efficacy of phosvitin, carvacrol, or nisin, alone or combined against foodborne human enteric pathogens."

Jennifer Rayner, Ph.D., Toxicologist at Oak Ridge National Laboratory, Oak Ridge, TN. Title: "From the Laboratory to the Desk: My Journey (so far) as a Scientist".

Vicki Grassian, Ph.D., University of Iowa, Department of Chemistry, Human Toxicology. "Impacts of Manufactured Nanomaterials on Human Health and the Environment - Inhalation Toxicology of Manufactured Nanoparticles".

Colleen Hogan, Biomedical Sciences, **Kanthasamy Lab** Title: "Role of Protein Kinase Signaling in Metal-induced Augmentation of Neuroinflammatory Processes"

Fumio Matsumura, Ph.D., Departments of Environmental Toxicology, and Entomology, University of California at Davis, Ca., Paul A. Dahm Memorial Lecture in Entomology Title: "Studies on Insecticide Mode of Action: History and Current Research Activity"

Zhiyi Qiang, Food Science and Human Nutrition, **Hendrich Lab**, Title: "Bioavailability and Metabolism of Key Components in Botanical Extracts: Importance to Gut Health"

Suzanne Hendrich, Ph.D., Food Science and Human Nutrition, "Developing Our Scientific Thinking Mindsets".

Diane Birt, Ph.D., Food Science and Human Nutrition, "Identifying molecular targets for interactive anti-inflammatory constituents in *Hypericum perforatum*."

Kabhilan Mohan, Biomedical Sciences, **Grozdanic Lab**, "Functional Retinal Ganglion Cell PERG Deficits in an Acute and Chronic Mouse Model of Parkinson's Disease."

Qijing Zhang, Ph.D., Veterinary Microbiology and Preventive Medicine, "Genetic mechanisms of arsenic resistance in *Campylobacter*"

Sheryl Beauvais, Ph.D., Staff Toxicologist, California EPA with Entomology Seminar Series, "Realistic Risk Assessment: Complaints of Pesticide-Related Illnesses Can Be Used to Ground-Truth Off-Site Human Health Risk Estimates for Chloropicrin."

Arunkumar Asaithambi, Biomedical Sciences (**Kanthasamy Lab**), "Drug Discovery in Parkinson's Disease (PD): Rationally designed modulators of a newly discovered signal transduction circuit and its potential use as therapeutic agents in PD."

Lori Adams-Phillips, Ph.D., Department of Biology, University of Iowa, Title: "Scientific Teaching: Taking Action in Science Education Reform."

Christine M. Blaumueller, PhD, Scientific Editor, Scientific Editing Service for the Basic Science Departments, The University of Iowa, Roy J and Lucille A Carver College of Medicine, "Productive Paper Submission: Perspectives from the Journals World."

Chuanzhe (Michael) Song, Biomedical Sciences, Kimber Lab, "Utilizing RNAi As A Means To Investigate & Elucidate Potential Parasite Drug Targets."

Aileen Keating, Ph.D., Animal Science, Iowa State, "Xenobiotic-induced Ovotoxicity."

Venkatesh Mani, Animal Science, **Gabler Lab**, "Differential modulation of endotoxin transport in the intestine by dietary fatty acids. "

Faculty Retirements



Patricia Murphy, University Professor, Food Science and Human Nutrition retired this spring (2011). Pat held the leadership role to organize Tox 501 Introduction to Toxicology for several years. "I am not staying completely out of the office. I was honored with being named an Emeritus University Prof. I still have one postdoc who will be going to a job at Nestle's the end of July and one Food Sci PhD who hopes to finish in Jan 2012. I still have papers to finish with these two folks and from Iowa Botanical Center.

"For non-work, more trout fishing is in the mix. Also plan to spend more time working on family genealogy and find out where the Irish immigrant ancestors came from in Ireland in 1850s or earlier."



Patricia Murphy, a food scientist, works with high performance liquid chromatography (HPLC) apparatus to separate compounds such as the soybean isoflavones genistin and daidzin.

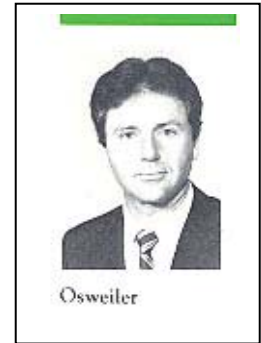


Gary Osweiler, Veterinary Diagnostic and Production Animal Medicine retired at the end of the fall semester (2010). "Since retiring from ISU last December, I've had a variety of experiences - and I really am enjoying the flexibility of largely setting one's own schedule.

"In spring this year I provided 13 lectures in Dr. Ensley's Vet Tox 426 course where I had previously taught the whole course from 2005 - 2011 after Dr. Tom Carson left ISU. Also I completed publication as co-editor of a new book on Small Animal Toxicology and chapters in two other books. I am involved in doing some

consulting in clinical veterinary toxicology topics including copper poisoning to aflatoxin, vomitoxin, selenium and a few others.

“Sue and I have a pretty substantial involvement on our farm that includes landscaping, flower and vegetable gardening, timber restoration, managing a 4 acre pond and 17 acres of prairie. Also now time for some bird watching and have also completed the Boone County Master Conservationist Program. For my project, Dr. Jim Jordan (local retired veterinary practitioner) and I are collecting some stream samples and doing on-site quality testing for the IOWATER program - a state managed survey of water quality in Iowa streams, lakes and rivers.



“And, last but not least, there is more time for visiting or keeping track of 5 grandchildren - great way to watch the renewal of the humankind without as much of the direct responsibility (and besides as all grandparents know they are a great source of fun)! So, there is life after retirement - just not enough time to take it all in (and one moves a bit more slowly as years pass).”

Toxicology Faculty doing interesting things.

Suzanne Hendrich, Food Science and Human Nutrition: “I recently received funding from the US Wheat Barley Scab Initiative (scab is a *Fusarium* fungal disease) to study the human gut metabolism of deoxynivalenol (DON) glucoside, a form of this fungal toxin produced in some wheat varieties that show lower DON concentrations. However, we are proposing that this form of the toxin will be converted to DON in the lower gut, changing its site of absorption and possibly changing its sites of action to affect the colon. We will synthesize DON glucoside and incubate it with fecal samples to examine what metabolites are produced. My students have all the fun!”



Some Recent publications (people in bold have ties to TOX):

Qiang Z, Truong M, Meynen K, **Murphy PA**, **Hendrich S** (2011), Efficacy of a mycotoxin binder against dietary fumonisin B1, deoxynivalenol and zearalenone in rats. *J Agric Food Chem*, in press.

Renouf M, **Hendrich S** (2011) *Bacteroides uniformis* is a putative bacterial species associated with the degradation of the isoflavone genistein in human feces. *J Nutr*. 141:1120-6.

Renouf M, **Hendrich S**. (2011) Lesser in vitro anaerobic cecal isoflavone disappearance rates were associated with greater apparent absorption of daidzein and genistein in Golden Syrian hamsters. *Food Funct*. 2:273-8.

Hendrich S, **Birt DF**, **Li L**, **Zhao Y**. (2011) Colon Health and Resistant Starch: Human Studies and Animal Models. In: Resistant Starch: Sources, Applications and Health Benefits, Maningat O, Shi Y-C, eds., Chicago: IFT Press, in press.

Hendrich S (2010) N-3 Fatty Acids: Clinical trials in People with Type 2 Diabetes. *Adv Nutr*. 1: 3-7.

Hasjim J, **Lee S-O**, **Hendrich S**, Setiawan S, Ai Y, Jane, J-L. (2010) Characterization of a novel resistant-starch and its effects on postprandial plasma-glucose and insulin responses. *Cereal Chem* 87: 257-62.

Hendrich S (2010) Battling obesity with resistant starch. *Food Technol Mar* 2010, 23-30.

Simons AL, **Renouf M**, **Murphy PA**, **Hendrich S**. (2010) Greater apparent absorption of flavonoids is associated with lesser human fecal flavonoid disappearance rates. *J Agric Fd Chem* 58:141-147.

Park, H-Y., Nam, M-H., **Lee, H-S.**, Jun, W., **Hendrich, S.**, Lee, K-W. (2010) Isolation of caffeic acid from *Perilla frutescens* and its role in enhancing γ -glutamylcysteine synthetase activity and glutathione level. *Food Chem* 119: 724-30.



Zhiyi Qiang, Martin Mutambuka, **Esther Haugabrooks**, **Zhong Ye**, **Suzanne Hendrich**, and **Li Li** at Hickory Park Restaurant in Ames.

Joel Coats, Entomology. "We have begun testing natural insecticides and natural repellents against bed bugs, the latest scourge of humanity, to address their resurgence everywhere. I



I gave an invited presentation on Green Chemistry for Insect Repellents at an international conference on mosquito control in Beijing, China in May 2011. I was promoted to Distinguished Professor. I will be interim chair of both NREM and Entomology for hopefully only a few months. **Aaron Gross** a Ph.D. Toxicology student in my lab has received a U.S. EPA STAR Fellowship for the next three years. Aaron was the



runner-up for best M.S. thesis at Iowa State, in the Graduate College's competition for the Midwestern Association of Graduate Schools' Best Masters Thesis.

Some Recent publications (people in **bold** have ties to TOX):

Paluch, G.E., L.C. Bartholomay, and **J.R. Coats**. 2010. Mosquito repellents: a review of chemical structure diversity and olfaction. *Pest Manag. Sci.* 66:925-935.

Murphy, Ian J. and Joel Coats. 2011. The capacity of switchgrass (*Panicum virgatum*) to degrade atrazine in a phytoremediation setting. *Environ. Toxicol. Chem.* 30: 715-722.

Tong, Fan and Joel Coats. 2010. Effects of monoterpenoid insecticides on [³H]-TBOB binding in house fly GABA receptor and ³⁶Cl⁻ uptake in American cockroach ventral nerve cord. *Pestic. Biochem. Physiol.* 98:317-324.

Carroll, J.F., **G. Paluch, J. Coats** and M. Kramer. 2010. Elemol and amyris oil repel the ticks *Ixodes scapularis* and *Amblyoma americanum* (Acari: Ixodidae) in laboratory assays. *Expt. Appl. Acarol.* 51:383-392.

Zhao, S., **Belden, J., Cink, J., Coats, J.** 2010. Mobility of five termiticides in soil columns, *Proceedings of the 2010 NCUE* (Portland, OR, 169-174, 2010).

U.S. Patent No. 7,939,091; 2011. Biorational Repellents Obtained from Terpenoids for Use against Arthropods - B2

New Toxicology faculty member



Dr. Stephanie Hansen's area of research interest through the Department of Animal Science is ruminant nutrition with an emphasis on mineral metabolism. Molecular mechanisms responsible for absorption and transport of minerals in cattle, as well as the interactions between trace elements, are key areas of her work. Dr. Hansen's research also addresses nutritional challenges that Midwestern cattle producers face. Current projects are focused on elucidating metabolic explanations for the toxicity of sulfur, as well as the effects of sulfur on trace mineral metabolism and production efficiency of cattle. Dr. Hansen is a member of the Interdepartmental Graduate Program in Nutritional Sciences and the Interdepartmental Toxicology Program.

Some recent publications:

Hansen, S. L., Trakooljul, H.C. Liu, J.A. Hicks, M.S. Ashwell, and J.W. Spears. 2010. Proteins involved in iron metabolism in beef cattle are affected by copper deficiency in combination with high dietary manganese, but not by copper deficiency alone. *J. Anim. Sci.* 88(1):275-83.

Hansen, S. L., Trakooljul, N., Spears J.W., and H.C. Liu. 2009. Age and dietary iron affect expression of genes involved in iron acquisition and homeostasis in young pigs. *J. Nutr. Epub.* ahead of print.

Hansen, S. L., N. Trakooljul, H-C. Liu, A. J. Moeser, and J. W. Spears. 2009. Iron transporters are differentially regulated by dietary iron, and modifications are associated with changes in manganese metabolism in young pigs. *J. Nutr.* 139:1474 - 1479.

Hepburn, J. J., J. D. Arthington, **S. L. Hansen**, J. W. Spears, and M. D. Knutson. 2009. Copper chaperone for Cu, Zn superoxide dismutase: A potential biomarker for copper status in cattle. *J. Anim. Sci.* Accepted.

Hansen, S. L. and J.W. Spears. 2009. Bioaccessibility of iron from soil is increased by silage fermentation. *J. Dairy Sci.* 92: 2896-2905.