

INTERDEPARTMENTAL GENETICS ALUMNI NEWSLETTER December 2005

Ames, The Cyclone State* Iowa

The Interdepartmental Genetics program faculty, graduate students and staff wish you and your families a joyful holiday season and Happy New Year. Here are some of the awards, events and activities that IG faculty and graduate students were involved in this year.

*We won the game that matters and the state of IOWA is a **CYCLONE STATE!** Both Iowa State (Houston Bowl) and the University of Iowa (somewhere warm) will be going to Bowl Games. Sometime during a commercial during the Houston Bowl on Dec. 31, 2005 which begins at 1:30 p.m. CST a journalism alumnus of Iowa State will be featured and it will show briefly a *C. elegans* lab in the Molecular Biology building.



RESEARCH EXCELLENCE WINNERS

Students from many majors, including five genetics majors, were selected for excellence in research awards for fall semester 2004, spring 2005, and summer 2005 because they had completed outstanding theses or dissertations. Each winner received a letter of commendation from ISU President Gregory Geoffroy and the award is noted on his or her university transcript. At graduation, recipients are recognized in the commencement program and wear honor cords over their robes. Also, together with their diploma, they will receive a certificate of achievement signed by the University President and the Graduate Dean.



Fall 2004: **Weiguo Zhang** (BBMB/Johansen).
Spring 2005: **Ericka Havecker** (GDCB/Voytas).
Pictured on the left: Summer 2005: Front row: **Ramon Gonzalo Leon-Gonzalez** (Agronomy/Bassham); ... President Geoffroy. **Middle row:**

Provost Allen; **Feng Zhang** (GDCB/Tom Peterson); ... Summer 2005, but not pictured, **Yongjie Yang** (BMS/Kanthasamy).

TWENTY-FIVE IG GRADUATE STUDENTS COMPLETE DEGREE IN LAST TWELVE MONTHS

IG graduated 25 students between Fall 2004 and Summer 2005: **Brad Coats** (Entom/Voytas), **Milan Joksimovic** (AnSci/Tuggle), **Ramon Leon-Gonzalez** (GDCB/Bassham), **Joseph McElroy** (AniSci/Dekkers/Lamont), **Bing-Bing Wang** (GDCB/Brendel), **Xu Min** (Agron/Palmer), **Yongjie Yang** (BMS/Kanthasamy), **Feng Zhang** (GDCB/Tom Peterson), **Ling Chen** (Plt Path/Bogdanove), **Brad Hall** (Hort/Lashbrook), **Jin Long** (Agron/Jannink), **Seiko Makino** (Plt Path/Bogdanove), **Carissa Stelman** (AnSci/Reecy), **Mingxu Zhang** (BBMB/James), **Junli Ji** (Agron/Bhattacharyya), **Wendy Sparks** (VMPM/Carpenter), **Matt Abbott** (AniSci/Tuggle), **Joseph Robins** (Agron/Brummer), **Martin Wubben** (Plt Pth/Baum), **Weiguo Zhang** (BBMB/Johansen), **Symantha Miller Anderson** (AniSci/Reecy), **Ericka Havecker** (GDCB/Voytas), **Dondra Bailey** (GDCB/Rodermel), **Laura Hittmeier** (AniSci/Stahl) and **Allison McDaniel** (GDCB/Ford).

EIGHTEEN NEW STUDENTS BEGIN GRADUATE TRAINING IN GENETICS

Seventeen new students joined the IG program in the last 12 months. These students are from U.S. universities including Northern Iowa, Tuskegee, Clemson, University of Nebraska-Lincoln, Kansas State, University of Wisconsin-Madison, Purdue, Iowa State and University of Illinois Urbana-Champaign. International students recruited were from Romania, India and China.

ISU PLANT SCIENTIST LEADS NATIONAL EFFORT TO USE METABOLOMICS TO UNLOCK GENE FUNCTION. Metabolomics uses sophisticated instruments to accurately measure, en masse, the biochemicals (metabolites) that make up an organism. A \$1 million NSF grant project led by **Basil Nikolau**, BBMB, will fund a project focused on understanding how genes function to regulate biological processes in plants

USDA NATIONAL NEEDS FELLOWSHIPS IN ANIMAL MOLECULAR BIOLOGY

Chris Tuggle, Animal Science, and **Qijing Zhang**, VMPM, are the Project Directors for newly awarded USDA National Needs Fellowships in Animal Molecular Biology. Selected Fellows will participate in 3 to 4 research lab rotations during their first year of graduate study with animal molecular biology faculty. The areas of animal molecular biology with emphasis in genomics and bioinformatics include Animal and Microbial Genomics, Animal Growth and Development, and Food Safety and Disease Resistance.

If you are working with undergraduates or MS students who might be interested in these Fellowships, have them contact genetics@iastate.edu for further information. \$22,000 per year + full tuition + health insurance.

NSF IGERT \$30,000 PER YEAR FELLOWSHIPS IN COMPUTATIONAL MOLECULAR BIOLOGY

<http://igert.iastate.edu/>

Iowa State University (ISU) and New Mexico State University (NMSU) have been awarded a five-year \$3 million National Science Foundation Integrative Graduate Education and Research Training (IGERT) grant for computational molecular biology. The grant was secured by a team of ISU and NMSU faculty headed by **Dan Voytas**, ISU professor of Genetics, Development and Cell Biology and Des Ranjan, NMSU professor and chair of Computer Science. Research areas supported are genomic informatics, metabolic and regulatory networks, and macromolecular dynamics and interactions. The principal goals for the new NSF IGERT grant are to lead the field of computational biology into the next era of discovery and to educate a diverse group of professionals to spearhead this effort. Genetics majors are eligible for consideration for award of these Fellowships.



NEW IG T-SHIRTS

We ordered new IG t-shirts this year. You can pretty much tell what graduate program we belong to 😊.

ISU SCIENTISTS PART OF MAIZE GENOME SEQUENCE PROJECT.

Iowa State scientists will play a major role in the three-year maize genome sequence project. **Patrick Schnable**, Agron/GDCB, along with Srinivas Aluru, Computer and Electrical Engineering, will lead the Iowa State effort. ISU is one of four institutions selected for the \$29.5 million project. A maize map will allow scientists to more effectively develop corn with traits like enhanced nutrient composition

for better food and feed, higher energy content for renewable fuel production, or improved characteristics for use in industrial raw materials. ISU News Service-Teddi Barron.

BIOSCIENCES ALLIANCE OF IOWA FUNDS ISU

The Biosciences Alliance of Iowa (BAI) has awarded funding to two projects at ISU designed to advance the state's bioscience industry. One project is a joint effort between ISU and University of Iowa to create a high-throughput facility to develop animal models of human disease. **Max Rothschild**, Animal Science, is one of the researchers who will focus on potentially blinding eye diseases such as glaucoma and age-related macular degeneration using large animal ocular disease models. ISU News Service-Teddi Barron

KANTHASAMY NAMED TO LLOYD PROFESSORSHIP AT IOWA STATE

Anumantha Kanthasamy, BMS, whose biomedical research has advanced scientific understanding of the link between Parkinson's disease and agrochemicals, has been named W. Eugene and Linda R. Lloyd Endowed Professor in ISU's College of Veterinary Medicine. He has made significant advances in our understanding of serious neurological disorders such as Parkinson's disease, and in developing therapies and treatments for these disorders. Kanthasamy leads a large research program supported by NIH. ISU News Service-Teddi Barron.

THOMAS BAUM NAMED PLANT PATHOLOGY CHAIR

Former IG Chair, **Thomas Baum**, became Chair of the Department of Plant Pathology November 1. He replaces former Plant Pathology and IG Chair, **Charlotte Bronson**, who was appointed associate vice provost for research in September.

PLANT DISEASE RESEARCH

Roger Wise and **Steve Whitham**, both Plant Pathology, are part of a group of researchers at ISU that received \$2 million to study plant disease. They will use genomic tools and resources related to barley, rice and the plant model *Arabidopsis thaliana* to perform comparative analysis of disease defense pathways important to agriculture.

HIGHLY CITED PLANT DISEASE ARTICLE A 'NEW HOT PAPER'

An article co-authored by **Adam Bogdanove**, plant pathology, has been identified by Thomson-ISI to be one of the most cited papers in the field of plant and animal science. The article, "Understanding the functions of plant disease resistance proteins," was published in the Annual Review of Plant Biology in 2003. The paper presents the researchers' current understanding of how plants defend themselves against microbial attack that would otherwise lead to disease. The article is featured as a "New Hot Paper" on the ESI Special Topics Website at: <http://esi-topics.com/nhp/2005/january-05-Bogdanove-Martin-Sessa.html>.

NATURE COVER

Erik Vollbrecht is focusing on two areas of maize research: plant evolution and development, and functional genomics. His research on the development and evolutionary roles of genes involved in shoot meristem function and plant reproduction examines molecular genetic mechanisms in a comparative framework. Genes that control development of tassels and ears in maize are used to determine the bases of similarities and differences among grasses, including cereal crops. His research on the evolution and domestication of maize made the front cover of NATURE. The 97 year old Illinois-grown ear of corn seen on the cover is located in the Molecular Biology building.



THREE NEW IG FACULTY

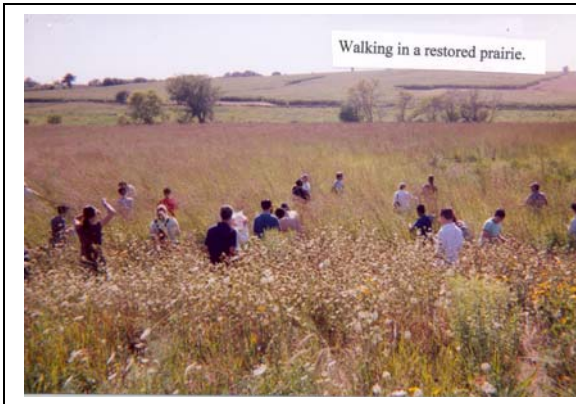
Anne Bronikowski, EEOB, studies evolutionary and ecological studies of life-history variation focusing on the causal agents of varying life-history traits, the subsequent variation in birth and death rates, and the sensitivity of fitness to alterations in these rates. Life history evolution has attracted much attention in recent years, particularly the evolution of senescence and the evolution of seemingly non-optimum variation in life histories (e.g., slow growth, late reproduction, low reproductive effort). Two complementary approaches to understanding the evolution of senescence are (i) to manipulate model systems to identify the genetics and evolvability of senescence and (ii) to ask how and why senescence evolves in natural populations.

Stephen Proulx, EEOB, uses mathematical tools to study problems in evolutionary ecology. His goal is to reveal the underlying mechanisms that cause evolutionary change, recognizing that these changes occur against the backdrop of ecological dynamics. By understanding the mathematical details that lead to particular evolutionary dynamics, he hopes to both increase our understanding of the forces that generate observed patterns and produce testable hypotheses. Much of his current work is focused on understanding the evolutionary forces that structure genomes. Do genomes evolve to be robust? How do multi-gene families form? What evolutionary forces act to shape the machinery of DNA replication, transcription, and translation? His research has shown that environmental and ecological context play a surprisingly large role in the evolution of these basic genomic features. Recent publication: **Proulx, S. R.**, Promislow, D. E. L., and Phillips, P. C. 2005. Network thinking in ecology and evolution. TREE 20(6):345-353.

Jeffrey Essner, GDCB, is looking at genomic approaches in modeling the ability of cancer cells to migrate and form a blood supply. He will identify genes that are required at specific steps in cancer progression and understand the roles of cell-cell signaling during endothelial cell migration and tissue morphogenesis. Zebrafish will be used for high-throughput screening of gene function and mouse knockout and cancer models for gene function and compound validation.

FALL 2005 IG RETREAT

The new IG students listened to several short research presentations in the morning of the retreat. We then took a bus to Pella, Iowa, which is known for its Dutch architecture, canals, and baked goods for lunch and to look around the town square. Then we went to the Neal Smith



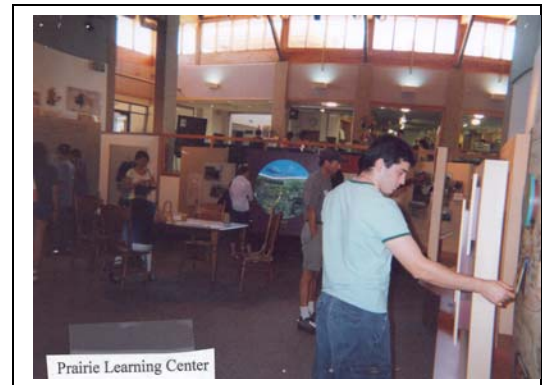
National Wildlife Refuge and Prairie Learning Center. The Refuge was created by an act of Congress in 1990 to re-create 8000 acres of tallgrass prairie, oak savanna, and the native plant and animal communities

existing in central Iowa prior to Euro-American settlement in the 1840's. Tom Jurik, EEOB, took us to several prairie restoration sites. It was a nice sunny day for an adventure!



ISU RANKINGS

US News and World Report's annual ranking of "America's Best College" ranks Iowa State 85th overall and 19th among the 106 land-grant colleges. Washington



Monthly looks at the criteria of what a college can do for you and ranks Iowa State as 34th. Iowa State ranks among the top 10 schools in encouraging service to the community and country. ISU is the 10th most cited institution in the world in agricultural sciences according to In-Cites, a Web site that tracks the use of scientific information (Ames Tribune, March 5, 2005). ISU is among the most fittest colleges, ranking No. 3 according to Muscle and Fitness Magazine. **HIGHLY EDUCATED WORK FORCE:** The City of Ames ranks third nationally when it comes to having a highly-educated work force that knowledge-based businesses require, according to a recent study by Expansion Management magazine. (Ames Tribune)

LINDA'S NEWS

I am one year closer to retirement (7 years to go ☺). I took some time off this past summer and launched a "dejunkification" of my house. I went through every cupboard and storage space in the garage and the downstairs of my house (I am saving upstairs for next summer) and disposed of at least a ton of stuff. My original intention was to paint the bedroom (it was so hot and muggy this past summer I couldn't get the paint to come off the brush and stick to the walls). I had to move things out of the bedroom, which meant I had to move things out of the way of the things that were coming out of the bedroom.

I have four classes/labs to go to finish a BS in biology. I am thinking I will complete the degree in 2007 and then I will have to find a new major ☺ to keep myself entertained. Best wishes to all of you. Stay warm, wear red and yellow, enjoy your adventures, stay in touch and may all your research be productive.



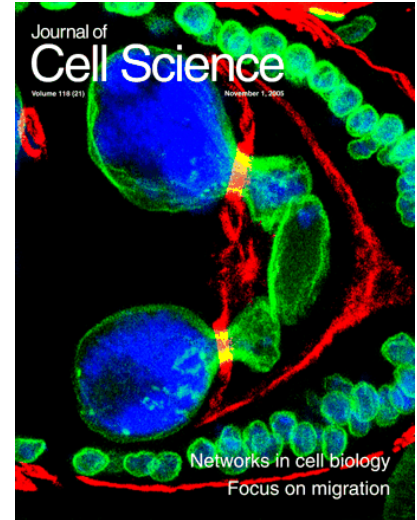
RECENT IG STUDENT and FACULTY PUBLICATIONS

Here is a sampling of recent research publications by **IG students** and **faculty** during the last couple of years. We thought it might give you an idea of the kinds of research on-going in the IG program.

Grover, C.E., Kim, H-R, Wing, R.A., Paterson, A. H. and **J. F. Wendel**. 2004. Incongruent patterns of local and global genome size evolution in cotton. *Genome Research* 14:1474-1482.

Vollbrecht, E. and **B Sigmon**. 2005 "Amazing grass: developmental genetics of maize domestication." *Biochem Soc Trans.* 33 (2005): 1502-1506.

Bao, X., W. Zhang, R. Krencik, Y. Wang, **J. Girton, J. Johansen**, and K.M. Johansen. 2005. The JIL-1 kinase interacts with lamin Dm0 and regulates nuclear lamina morphology of *Drosophila* nurse cells. *J. Cell Sci.* 118: 5079-5087. (** note that we got the cover of the journal for Xiaomin's article!-- Two deformed *Drosophila* nurse cell nuclei protruding through the ring canals toward the oocyte in a JIL-1 kinase mutant egg chamber. The confocal image is a triple labeling of lamin (green), actin (red) and DNA (blue).) (Ed. Note: Krencik and W. Zhang are alumni of IG)



Uthe, J. J. Stabel T.J., Zhao, S.-H, **Tuggle, C.K.** Bearson, S.M.D. Analysis of porcine differential gene expression following challenge with *Salmonella enterica* serotype Choleraesuis using suppression subtractive hybridization. (accepted for publication in *Veterinary Microbiology*).

Zhao, H., D. Nettleton, M. Soller, **J. Dekkers**. 2005. Evaluation of linkage disequilibrium measures between multi-allelic markers as predictors of linkage disequilibrium between markers and QTL. *Genetical Research* 86: 77-87.

Gao, H., Narayanan N.N., Santra D. K., Ellison L. and **Bhattacharyya M.K.** 2005. Two classes of identical functional coiled-coil/nucleotide-binding site/leucine-rich repeat-type genes encode the *Phytophthora* resistance of the *Rps1-k* locus in soybean. *MPMI* 18:1035-1045.

Lonosky PM, Zhang X, Honavar VG, **Dobbs DL, Fu A, Rodermel SR**. 2004. *Plant Physiology*. 134(20): 560-74. A proteomics analysis of maize chloroplast biogenesis. (Ed. Note: Lonosky is alumni of IG).

Anthony L. Contento, **Sang-Jin Kim** and **Diane C. Bassham**. 2004. Transcriptome profiling of the response of *Arabidopsis* suspension culture cells to Suc starvation. *Plant Physiology*. 2004 Aug; 135(4):2330-47.

Mitreva, M., **Elling A.A.**, Dante, M., Kloek, A.P., Kalyanaraman, A., Aluru, S., Clifton, S.W., McK. Bird, D., **Baum, T.J.**, and McCarter, J.P. 2004: A survey of SL1-spliced transcripts from the root-lesion nematode *Pratylenchus penetrans*. *Mol. Genet. Genomics*, 272:138-148.

Rapp, R.A. and **J. F. Wendel**. 2005. Epigenetics and plant evolution. *New Phytologist*. 168:81-91.

Yandeau-Nelson MD, Q Zhou, H Yao, X Xu, **BJ Nikolau, PS Schnable**. 2005. *MuDR* transposase increases the frequency of meiotic crossovers in the vicinity of a *Mu* insertion in the maize *al* gene. *Genetics*, 169:917-929.

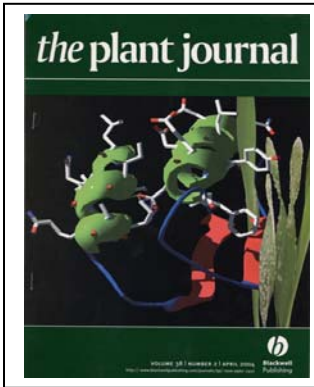
Zhang, J. and **T. Peterson**. 2005. A segmental deletion series generated by sister-chromatid transposition of *Ac* transposable elements in maize. *Genetics*. 2005 Sep;171(1):333-44. (Ed. Note: Zhang J is an alumnus of IG)

Lerach, S., W. Zhang, H. Deng, **X. Bao**, **J. Girton**, **J. Johansen** and K.M. Johansen. 2005. The JIL-1 kinase, a member of the MSL complex, is necessary for proper dosage compensation of eye pigmentation in *Drosophila*. *Genesis*: 43:213 - 215. (Ed. Note: Lerach and Zhang are alumni of IG)

Fu Y, SJ Emrich, L Guo, T-J Wen, S Aluru, DA Ashlock, **PS Schnable**. 2005. Quality assessment of maize assembled genomic islands (MAGIs) and experimental verification of predicted novel genes. *Proceedings National Academy Science*, 102:12282-12287.

Zhang, F. and **T. Peterson**. 2005. Comparisons of maize *pericarp color 1* alleles reveal paralogous gene recombination and an organ-specific enhancer region. *The Plant Cell* 17: 903 914.

Adams, C., J. Pitzer, and **F. C. Minion**. 2005. In vivo expression analysis of the P97 and P102 paralog families of *Mycoplasma hyopneumoniae*. *Infect. Immun.* 73:7784-7787.



Halterman, D and **RP Wise**. 2004. A single amino acid substitution in the sixth leucine-rich repeat of barley MLA6 and MLA13 alleviates dependence on RAR1 for disease resistance signaling. *Plant Journal* 38: 215-226. Cover article. (Ed. Note: Halterman is married to an IG alumnus ☺, Hi Leslie!).

Yao H, **PS Schnable**. 2005. *Cis*-effects on meiotic recombination across distinct *al-sh2* intervals in a common *Zea* genetic background. *Genetics*, 170:1929-1944.

Dahlin-Laborde, R.R., Yu, T.P., and **Beetham, J.K.** 2005. Genetic Complementation to Identify DNA Elements that Influence Complement Resistance in *Leishmania chagasi*. *Journal of Parasitology* 91, 1058-1063.

Krenz, J. G., G. J. P. Naylor, H. B. Shaffer, and **F. J. Janzen**. 2005. Molecular phylogenetics and evolution of turtles. *Molecular Phylogenetics and Evolution* 37:178-191.

Review by **Edward Pollak**, Statistics, of " Consanguinity, Inbreeding and Genetic Drift in Italy. Monographs in Population Biology 39", by Luigi Luca Cavalli- Sforza, Antonio Moroni and Gianna Zei. In *American Journal of Human Biology*, Volume 17, Issue 1, 120-121, 2005.

Huang, Z., Yeakley, J. M., Wickham, E., Holdridge, J. D., Fan, J.-B., and **Whitham, S. A.** (2005). Salicylic acid dependent expression of host genes in compatible Arabidopsis-virus interactions. *Plant Physiol.*137:1147-1159

2006 IG Workshop: Genetics of Disease

2007 IG Workshop: Genetic Mysteries



"The heritage of Iowa as I know it, learned it, and live it, is the ethical imperative to leave the place better than you found it. This value, along with the other equally ingrained values including making do with little, working hard for the simple reward of hard work, being progressive and pragmatic, and speaking plainly and directly, are of the Iowa soil. These values sustain me, and will root all of my actions as AIA president." Associate dean of ISU's College of Design Kate Schwensen (architecture '78, '80), speaking at her inauguration as the 82nd president of the American Institute of Architects (AIA) Dec. 9 in Washington, D.C.:

Frost-covered trees backdrop the Roy J. Carver Co-Lab as seen from the window of the Molecular Biology Building. December 2005