Interdepartmental Genetics Chair: Phil Becraft, Professor, Genetics, Development and Cell Biology

Graduate Education: collaboration, teamwork, presentations, publications, focus.

As IG trains students to be successful in scientific enterprises across the nation and around the world, the program has a long-term commitment to diversity. The IG program includes students from many countries, and we continue to recruit students at meetings that attract outstanding minority students (such as MANRRS and SACNAS). Recent IG chair, Fred Janzen, and the current IG Associate Chair, Jo Anne Powell-Coffman, have key roles in the NSF-funded ADVANCE program, which aims to increase recruitment and retention of women faculty in science, technology, engineering, and math fields at ISU. Faculty and students also mentor a diverse cadre of undergraduate and high school summer interns working on research projects. Collectively and individually, IG faculty and students are working to expand the diversity of people, ideas, and cultures on campus, and this continues to enhance innovation and education in the field of genetics.
**ALUMNI UPDATES**

**Rita Sanzgiri** (Ph.D/Genetics/Dobbs/Hayden) lives in Boulder, Colorado with her husband Craig Zeutzius and their two children Suhana and Jonas. She is a biotechnology patent attorney with the law firm of Sheridan Ross. “Fortunately, Biotech Intellectual Property does not seem to have been affected by the economic downturn and my practice has been really busy.”

**Jennifer Lee** (Ph.D/Genetics/Shoemaker) began working with NCBI/NLM/NIH in March 2008 and she is working on databases like Gene, OMIM and GeneTests. She went from Genetics to Bioinformatics to Databases and now she is enjoying doing development, maintenance and data processing for public genetic databases at NCBI. “I got married July 28, 2007 to Alan McKenna in Killarney, Ireland (with about 200 of his friends and relatives over there and 12 of mine). We had a baby July 18, 2009 Thomas Jeremiah McKenna (called TJ).”

**Jessica Schlueter** (Ph.D./Genetics/Shoemaker) Update! “I’m an Assistant Professor in Bioinformatics and Genomics at the University of North Carolina at Charlotte. I’ve been here since August 2009 and loving it. Shannon (from BCB and husband) is here as well, also an Assistant Professor in Bioinformatics and Genomics. We have 2 kids now; Harmon who is 5 and Elley who will be 3 in December. Loving the south and the lack of snow 😊.”

**Phil Irwin** (M.S./Genetics/Voytas) My updated Bio:
- I'm working for VWR (just celebrated my 5th year at VWR); I recently moved from Ames to the VWR HQ in West Chester, PA to accept the responsibility of Category Manager, Instruments for North America.
- I recently celebrated my 16yr wedding anniversary
- I have two girls Chloe 10 and Ava 8

**James Koltes** (Ph.D./Genetics/Reecy) is a post-doctoral fellow in the department of biochemistry at the University of Wisconsin-Madison working in the area of diabetes genomics. He is a Computation and Informatics in Biology and Medicine fellow (funded by NIH-NLM) working on discovery of genes that increase susceptibility to diabetes in the mouse and development of computational tools and methods to streamline this process. “The big news, as of today, is the publication of my dwarfism paper in PNAS!!! Koltes JE, BP Mishra, D. Kumar, RS Kataria, LR Totir, **RL Fernando**, R Cobbold, D Steffen, W Coppeters, M Georges, and JM Reecy. A nonsense mutation in cGMP-dependant type II protein kinase (PRKG2) causes dwarfism in American Angus cattle. Proceedings of the National Academy of Sciences. 2009. Early Addition.”

**Julie Clark Gonzalez** (M.S./Genetics/Janzen) is the Biotechnology Program Chair at Des Moines Area Community College in Ankeny.

**Yanling Wei** (M.S./Genetics/Schnable). “An update from me is that Xuehui Li (my husband), who transferred with Dr. Charlie Brummer from IG at ISU to the Institute of Plant Breeding, Genetics and Genomics at University of Georgia, graduated with his PhD in May this year! He is currently working as a Postdoc still in Dr. Brummer's Lab, where I'm still working as a lab manager (no change for myself). Besides, we had our second kid, Braden, born on Jan 26, 2008. So, we have two kids now, Amanda and Braden!”

Congratulations to **Jianbo Zhang** (Ph.D./Genetics/Tom Peterson) for receiving Honorable Mention in the ChloroFilms video contest! Jianbo submitted an animation showing how alternative transposition of maize Ac/Ds elements can shuffle gene exons. This is an international plant science film contest, organized by Dan Cosgrove, Penn State U. Please see [http://www.chlorofilms.org/?module=Pages&func=display&pageid=13](http://www.chlorofilms.org/?module=Pages&func=display&pageid=13) for details.
Research led by scientists at Iowa State University's Plant Sciences Institute has resulted in a process that will make genetic changes in plant genes much more efficient, practical and safe. The breakthrough was developed by David Wright (Ph.D./Genetics/Voytas), an associate scientist, and Jeffery Townsend, an assistant scientist, and allows targeted genetic manipulations in plant DNA, which could have a huge impact on plant genetic work in the future. Until now, when scientists introduced DNA into plants, they would randomly inject that DNA into the plant cell. There was no way of knowing if it was in the right place or if it would work until many resulting plants were tested. The new technique harnesses a natural process called homologous recombination to precisely introduce DNA at a predetermined location in the plant genome through targeted DNA breaks generated by zinc finger nucleases. This occurs about 1 in 50 attempts and is very efficient compared to unassisted methods that allow the same changes at a rate as low as 1 in 10 million. Using this process, a specific gene is located in a living cell, and then a break is made in the DNA of that gene. When the cell begins to heal itself, existing DNA can be deleted or modified, or new DNA can be added near the break site. Afterward, the cell carries the genetic change and passes the change on to its offspring. "It's like surgery, only on the molecular level," said Wright. "It's been known for a long time that if you make a break in a cell, you can get some DNA into that spot," said Wright. "It's just that you have three meters of DNA in a cell if you unwound it. Putting the break where you want it has always been the problem." Zinc finger nucleases solve the problem and allows scientists to take greater advantage of homologous recombination, according to Wright and Townsend. The research, published in the journal Nature, was performed in Dan Voytas' lab at Iowa State. Dan Kuester, News Service, (515) 294-0704, 07-20-09

Axel Elling (Ph.D./Genetics/Baum) has joined the faculty of the Department of Plant Pathology at Washington State University (WSU) as an assistant professor of molecular nematology. He obtained his Ph.D. degree in genetics from Iowa State University, where he worked under the guidance of Thomas Baum in the Department of Plant Pathology. His doctoral research focused on secreted effector proteins and genomics of the soybean cyst nematode. Prior to joining WSU, Elling was a post-doctoral associate in Xing Wang Deng’s laboratory in the Department of Molecular, Cellular, and Developmental Biology at Yale University. Elling’s research interests include molecular interactions between nematodes and their host plants and the processes that lead to successful parasitism, as well as functional genomics of host-microbe interactions. He is currently investigating the molecular aspects of two different pathosystems: Columbia root-knot nematode (Meloidogyne chitwoodi) infection of potato and root-lesion nematode (Pratylenchus spp.) infection of wheat. His teaching responsibilities include a graduate level course in plant nematology and a team-taught course in the molecular genetics of plant and pathogen interactions. He currently has an opening for a graduate student in his lab. http://plantpath.wsu.edu/people/faculty/elling.htm

Jodi McKay (Ph.D./Genetics/Buss/Ambrosio) accepted a position as assistant professor of biology and chemistry at Morningside College in Sioux City, Iowa. McKay joins the faculty after serving as a post-doctoral research fellow at Washington University in St. Louis. She previously served as a post-doctoral research fellow and a graduate research assistant for Iowa State University and as an undergraduate research assistant for Idaho State University in Pocatello.

Hongtao Qin (Ph.D./Genetics/Powell-Coffman) is at Cold Spring Harbor

Seiko Makino (M.S./Genetics/Bogdanove). “I was working in Cardiovascular research center at Massachusetts General Hospital as a research technician from 2005 to 2009. Currently I have just started my PhD in Oxford University, UK. Although I haven't defined my PhD project I am working on genetic variation and inflammatory responses. I am enjoying the big cultural difference in UK.

Kwang-Hyun Baek (Ph.D./Ambrosio/Zoology and Genetics) is now a full professor at CHA University in Seoul, Korea. "I am now a vice director for the CHA Stem Cell Institute at CHA University. I have 8 graduate students including four foreign students from India and China in my laboratory. Most of them (6 out of 8 students) are Ph.D. candidates. Regarding my family, I have a wife (Eulim Park) and two daughters (Sue Gene Baek and Sohjung Baek). These kids are 4 and 6 years old. By the way, our lab homepage is following: http://biomedicine.net"

Colin Shepherd (Ph.D./Genetics/Scott). “I moved the AimsBio to UW Madison Research Park to be near family and my brother is helping with the company. I've also taken the position of COO of PhylloTech LLC, a startup ag biotech company developing novel natural product fungicides, and we are in the process of opening up a UW research park lab and we have $$ from a NSF SBIR to help us along the way! I'm also working more with Shepherd Seeds, the family seed company and there are some opportunities there that are being developed.”

Mayumi Fukuda (M.S./Genetics/Zhang) is a third year microbiology Ph.D. student at the University of Iowa. She is enjoying living in Iowa City.

- Sixteen students were selected for Research Excellence Awards and five for Teaching Excellence Awards for the 2009 Summer Session.


Kimberly Hammer (Ph.D./Genetics/Birt) was recently awarded a Department of Defense Congressionally Directed Medical Research Programs Prostate Cancer Training Award. Kim is a Postdoctoral Research Associate at the School of Pharmacy, University of Wisconsin.
New Hach Chemistry Building (they are still working on the outside of the building). Just south (across the street) from the Molecular Biology Building.

Recent paleoarchaeological discoveries at Reiman Gardens in Ames has proven conclusively that birds are descended from dinosaurs. Note photographic evidence of red bird hatching from dino eggs. Also conclusively proving that Iowa has ALWAYS been the Cyclone State.
RECENT PUBLICATIONS OF IG GRADUATE STUDENTS

**Ruth A. Swanson-Wagner**, Rhonda DeCook, Yi Jia, Tim Bancroft, Tieming Ji, Xuefeng Zhao, Dan Nettleton, and **Patrick S. Schnable**. Paternal Dominance of Trans-eQTL Influences Gene Expression Patterns in Maize Hybrids. *Science* 20 November 2009: 1118-1120. Gene expression variation in maize hybrids is influenced by distant DNA sequences subject to paternal genomic imprinting.


Liu S, CT Yeh, T Ji, **K Ying**, H Wu, HM Tang, Y Fu, DS Nettleton, **PS Schnable** (2009). Mu transposon insertion sites and meiotic recombination events co-localize with epigenetic markers for open chromatin across the maize genome. PLoS Genetics, in press.


Flint-Garcia SA, Bodnar AL, Scott MP. Wide Variability in kernel composition, seed characteristics, and zein profiles among diverse maize inbreds, landraces, and teosinte. Theoretical and Applied Genetics 119(6), 2009.


Min Xu, Hargeet Brar, Sehiza G, Madan Bhattacharyya, Reid Palmer. Excision of an active CACTA-like transposable element from DFR2 causes variegated flowers in soybean[Glycine max (L.) Merr.]. Accepted for publication in GENETICS.


Shao, Z., Zhang Y., and Powell-Coffman JA. (2009) EGL-9 has dual functions with differing requirements for HIF-1 hydroxylation and EGL-9 hydroxylase activity. Genetics, in press.

PROFILES OF PRESENT GRADUATE STUDENTS

Name: David A. Hessel  
Current Year of Study: 2nd year in Ph.D.  
Hometown: Bettendorf, IA  
Undergraduate Institution and Major: Iowa State University, B.S. Biology (2007)  
Extracurricular Activities: I enjoy spending time outdoors when I have free time. There are some fantastic parks around the Ames area that are great for fishing, hiking, camping and canoeing. I also enjoy exercising, reading, watching movies, and spending time with friends and family when I have free time. I’m also a big fan of ISU football and wrestling.  
Why I Choose ISU: I decided to pursue my Ph.D. degree at Iowa State for a number of reasons. The faculty reputation is superb. I was very impressed with the discussions I had with faculty members during my visit. They showed a passion for their research and placed a strong emphasis on collaborating with other faculty members. The resources available to research scientists at ISU are cutting edge and at the forefront of science. These include access to next-generation sequencing, high-throughput genotyping platforms, plant transformation, microarrays, and resources available through the world-renowned Plant Sciences Institute. The size and feel of the city of Ames also fit my lifestyle very nicely. The friendly people and breadth of activities available make the Ames community a great place to pursue a graduate degree.  
Research Project(s): I’m currently a graduate student in Dr. Nick Lauter’s laboratory in the Department of Plant Pathology. One of the main projects I’m working on is trying to identifying native resistance in maize to the Western Corn Rootworm. The insect is one of the most damaging pests of maize worldwide and results in billions of dollars in revenue losses annually. It is a very adaptive pest and has developed resistance to several management strategies including insecticides and crop rotation. I’m trying to identify the genes that naturally control resistance to this insect in maize and develop maize lines that are naturally resistant. These lines can then be incorporated into commercial breeding programs and provide a more robust alternative for managing this pest. Our lab also focuses on identifying and characterizing maize genes that are involved in major developmental changes in the plant. Development in maize is a quantitative trait, so it is controlled by many different genes that collectively determine how and when the plant reaches maturity. Our lab has identified several genes that are involved in maize vegetative development and the individual effects of different alleles at these genes.  
Long Term Goals: I’m planning on completing my Ph.D. within the next four years and moving on to a post-doc position somewhere at another university. After a post-doc, I would like to get a position working as a lead research scientist in either a university or industry setting. At this point in my career I am still trying to keep my options open. Eventually, I would like to start my own biotech or seed science company.
Karri Haen, (Ph.D./Lavrov Lab/EEOB) is no stranger to the classroom. The doctorate student in genetics has taught recitation courses and assisted with classroom instruction in accompanying labs. But planning, preparing and delivering lectures throughout an entire course - that was entirely different. Thanks however to the Knaphus Teaching Fellowship at Iowa State University, Haen and other recipients have had the opportunity to plan, prepare and deliver lecture in their very own class.

"I had a fairly extensive teaching background," Haen said, "but I had always worked with others in putting the class materials together. This was my first opportunity to teach a lecture and teach it on my own accord." The Knaphus Teaching Fellowship was established by the late Marie Knaphus in honor of her husband George, a long-time botany professor on campus. George Knaphus was passionate about inspiring young minds and conducting research concerning fungi, particularly morel mushrooms. She taught Biology 101, a month-long introductory course for non-majors and was mentored by biology professor and award-winning teacher Jim Colbert.

Krishnakumar Sridharan (Ph.D./Brendel Lab/GDCB): "I was a TA for a Human Anatomy lab section in Fall 2009 and it’s been an experience that I've enjoyed. It’s a lotta hard work and you hardly have time to do your own research and courses. But its one job that’s taught me a lot about time management and efficient and smart work techniques. I find it an interesting challenge to learn a new subject and then teach it to undergraduates. Now, I also have an idea whether I want to be a teacher besides being a researcher.”
The Midwest American Society of Animal Science/American Dairy Science Association conference presented awards to graduate students and alumni. Graduate students Patricia Anderson, Nick Boddicker and Pete Lammers won all three of the innovative research and teaching awards. Grad student Rafael Nafikov received the Young Dairy Scholars Recognition and Innovation in Dairy Research Award. **Danielle Bowen Gorbach** (Ph.D./Animal Science/Rothschild lab) won the Graduate Ph.D. Oral Competition.

More dinosaurs at Reiman Gardens.

The new water park in Ames will open spring 2010.

On 13th Street about a 1/3 of a mile east of Stange.
SHORT ARTICLES ON GENETICS FACULTY

● Susan Lamont, a Charles F. Curtiss Distinguished Professor of Agriculture and Life Sciences and professor of animal science, received the Embrex Fundamental Science Award and was named a Fellow of the Poultry Science Association. The awards were presented at the association annual meeting in Raleigh, N.C.

● A research team led by Roger Wise in the Department of Plant Pathology had a research paper published in an October edition of The Plant Cell, the journal of the American Society of Plant Biologists. The paper, Transcript-Based Cloning of RRP46, a Regulator of rRNA Processing and R Gene-Independent Cell Death in Barley-Powdery Mildew Interactions, describes work on cell death in barley. Cell death is a key component in plant development and disease resistance. Because cell death can be a defensive mechanism for the host plant by restricting pathogen invasion, the research could provide clues for future disease control. The paper (http://www.plantcell.org/cgi/content/abstract/tpc.109.066167v1?papetoc) was highlighted in a brief written by the journals science editor, who states that the papers insights into a very interesting cellular process yields many intriguing possibilities for future research. AG AND LIFE SCIENCES ONLINE, The College of Agriculture and Life Sciences Newsletter, Iowa State University, Nov. 2, 2009 No. 577

● Research interests in the Wendel lab encompass molecular and genome evolution, phylogenetics, and phenotypic evolution of higher plants. In our laboratory we use a diverse set of technologies and approaches to explore the manner in which genomes change over evolutionary time, as well as the relationship between these events and morphological change. We have a particular interest in the mysterious and common phenomenon of polyploidy, with a special focus on the cotton genus.

Enjoy a movie of what they do, center column (science, humor, and cotton!):
http://www.eeob.iastate.edu/faculty/WendelJ/

The movie features Corrine Grover (Ph.D./Genetics/Wendel), Ryan Rapp (Ph.D./Genetics/Wendel) and Lex Flagel (Ph.D./Genetics/Wendel) and 57 varieties of cotton in the largest cotton “field” in Iowa:

● Iowa State researchers, including Basil Nikolau, Biochemistry, Biophysics and Molecular Biology, are working to understand how a catalyst allows certain plants and algae to create simple hydrocarbons that could be a new source of liquid fuels. The project is supported by a four-year, $2 million grant from the National Science Foundation's Office of Emerging Frontiers in Research and Innovation. More: http://www.news.iastate.edu/news/2009/oct/biohydrocarbons

● GDCB Professor Yanhai Yan will be recognized with a Mid-Career Research Award, which recognizes faculty members who have a national or international reputation for outstanding contributions in research and/or artistic creativity at the mid-career stage. Dr. Yin “exemplifies the next generation of plant scientists that will contribute to the enhancement of science at ISU and internationally.”
Dr. Martin Spalding, professor and chair of the Department of Genetics, Development and Cell Biology, has been studying microalgal organisms for over 30 years. His research with the model microalga, *Chlamydomonas reinhardtii*, holds promise for generating renewable biofuels and chemicals and is headlined in two reports recently posted on the Plant Sciences Institute (PSI) website, [http://www.plantsciences.iastate.edu/](http://www.plantsciences.iastate.edu/).

The first report, entitled “Green Slime Starts to Shine” [http://www.plantsciences.iastate.edu/new...lding.html](http://www.plantsciences.iastate.edu/new...lding.html), describes Dr. Spalding’s research studies with the microalga *Chlamydomonas reinhardtii* being done along with colleagues Dr. Larry Halverson, assistant professor in the Department of Plant Pathology and Dr. Basil Nikolau, Francis M. Craig Professor in the Department of Biophysics, Biochemistry and Molecular Biology. The second report is a video interview with Dr. Spalding conducted by PSI entitled “Make Way for Microalgae” [http://vimeo.com/5220271](http://vimeo.com/5220271). In the approximately six-minute video, Dr. Spalding describes why the microalga, *Chlamydomonas reinhardtii*, is uniquely suitable for genetic engineering to make biofuel.  <from GDCB homepage by Connie Garnett>

Dr. David Oliver, professor of genetics, development and cell biology and associate dean of LAS, been awarded $160,000 by the National Science Foundation for his research project entitled “Arabidopsis 2010: A New Pathway for GSH Metabolism in Plants.”

Plant growth and crop yields are very sensitive to toxic chemicals in their environment. Creating plants that are more resistant to environmental stresses and therefore crops that maintain their yields under unfavorable conditions, requires detailed knowledge of how GSH levels are controlled, both through how it is made and how it is broken down. While a lot is known about GSH synthesis and regulation, very little is known about how GSH is broken down. The Arabidopsis 2010 research project investigates a newly discovered enzyme activity, termed gamma-glutamyl cyclotransferase, which experiments suggest catalyzes a majority of GSH breakdown in the model plant *Arabidopsis thaliana*. Experiments in this project will define the gene and protein that are responsible for this enzyme activity in plants.

To benefit the research community, data and information generated through this project will be made available through the Arabidopsis Information Resource (TAIR: [www.arabidopsis.org](http://www.arabidopsis.org)). Seed stocks and any unique DNA materials will be made available through ABRC ([http://www.biosci.ohio-state.edu/~plantb...rchome.htm](http://www.biosci.ohio-state.edu/~plantb...rchome.htm)). To enhance education, the project will engage undergraduate students in research and professional development activities that are designed to expose them to advanced biotechnology, and enable them to continue careers in STEM disciplines. A postdoctoral research associate will be trained in research and mentoring, in preparation for a faculty career. In addition, undergraduates will work with the PI and the postdoctoral associate to develop a module on mitochondria to be included in the "Meta!Blast" virtual 3D cell, a web-based video environment designed to teach the basics of plant cell biology to precollege and beginning college students.  <from GDCB homepage by Connie Garnett>

$200,558 from the National Science Foundation to Patrick Schnable, professor of agronomy and associate director of the Plant Sciences Institute, to study genome evolution in natural populations of polyploid organisms.
GDCB Professor Thomas Peterson has been awarded $1M from the National Science Foundation for his research project entitled, "Mechanism and Genetic Impacts of Transposon-Induced Duplications in Maize".

Partial chromosome duplications (segmental duplications) are important contributors to the structure, function and diversity of plant and animal genomes. However, very little is known about how duplications are generated, and their immediate effects on gene expression and genetic recombination. Dr. Peterson and his research team will examine the potential role of transposable elements, or jumping genes, in generating segmental duplications. The project aim is to isolate and characterize a series of partial chromosome duplications in corn generated by Ac/Ds transposable elements.

This project research will provide significant new insight into the role of transposable elements in generating duplications, and the impact these duplications have on genetic recombination and gene expression. Research results may lead to significant advances in breeding of crop plants, which will improve agricultural efficiency and environmental sustainability. <from GDCB homepage by Connie Garnett>

$2,059,528 from the National Science Foundation's Emerging Frontiers in Research and Innovation program to Jackie Shanks, a professor of chemical and biological engineering; Basil Nikolau, professor of biochemistry, biophysics and molecular biology and deputy director of the NSF Engineering Research Center for Biorenewable Chemicals; and Thomas Bobik, a professor of biochemistry, biophysics and molecular biology, to develop a technology that uses a biocatalyst to produce biologically generated hydrocarbons that can be used for biofuels.

Drena Dobbs, Professor of GDCB; Dr. Daniel Voytas, collaborating faculty in GDCB and Director of the Beckman Center at the University of Minnesota; and Dr. J. Keith Joung, Professor at Harvard Medical School; have been awarded $3,365,001 by the National Science Foundation for their collaborative research project entitled “NSF TRPGR: Precise Engineering of Plant Genomes using Zinc Finger Nucleases.” Dr. Kan Wang, Professor of Agronomy and Director of ISU's Plant Transformation Facility is coPI on the ISU sub-contract award of $916,295.

The newly funded project will develop improved methodologies to enable genomics scientists to readily target and modify specific genes in plants and other organisms, including human. In collaboration with the Zinc Finger Consortium http://www.zincfingers.org/, the team has generated efficient platforms and computational resources for zinc finger protein (ZFP) engineering. At ISU, the Dobbs group will generate improved computational tools that reduce the time and expense required to design ZFPs and choose target sites that function successfully in vivo; the Wang group will develop improved protocols for gene targeting in rice, allowing researchers to better exploit the many genetic resources available for this model crop. Graduate research assistantships and seed funding for preliminary experiments that contributed to the success of the NSF proposal were provided by GDCB, BCB and CIAG at ISU, and an MGET training grant from the USDA. <from GDCB homepage by Connie Garnett>
A Center for Integrated Animal Genomics (CIAG) grant entitled, “Investigating Links Between Hypoxia Signaling Networks and the Regulation of Cell Migration and Death During Animal Development” has been awarded to Professors Clark Coffman and Jo Anne Powell-Coffman.

Oxygen is critical to animal life. Hypoxic (low oxygen) conditions occur in normal tissues, during heart attacks and strokes, and in tumor formation. Cells must adapt to low oxygen in order to survive. The hypoxia-inducible factor (HIF) has been shown to be the “master regulator” of oxygen-sensitive changes in gene expression in animals, and understanding how HIF is regulated has been one of the major goals of Dr. Powell-Coffman’s research group over the past several years. This collaborative project investigates the roles of hypoxia and HIF in the experimental system that Dr. Coffman and his colleagues have developed. The Coffman group employs the fruit fly Drosophila melanogaster as a powerful genetic model system to study the genetic and cellular underpinnings of animal development and disease. Developing germ cells share certain key traits of metastatic cancer cells: they migrate across epithelial sheets to target tissues, and many germ cells are subject to programmed cell death. Elizabeth Asque (pictured here with Professors Coffman, left, and Powell-Coffman, right), a graduate student in the Interdepartmental Genetics program, will spearhead this project that will provide insights into how cells respond and adapt to low oxygen levels during migration, development, and disease. <from GDCB homepage by Connie Garnett>

Dr. Carolyn Lawrence (left in photo), collaborating professor in GDCB, has been honored by her employer, the USDA-ARS, with one of their 2009 Midwest Research Support Awards for Excellence. Dr. Lawrence was honored with an Equal Opportunity Award in recognition of her innovative and effective outreach to Native Americans, as under-represented minorities, in plant biology. The outreach to Native Americans program she coordinates is also now in the running for the Outreach, Diversity, and Equal Opportunity (ODEO) award for the agency. (See recent news item entitled “GDCB Professor Carolyn Lawrence receives additional funding from the Department of Energy” for more information)

This USDA-ARS awards program annually recognizes the outstanding achievements and creative efforts of individuals and groups in the support categories who have significantly contributed to the mission of the Agricultural Research Service. In addition to Dr. Lawrence, Darwin Campbell (right in photo), a member of her staff, was also recognized with a Direct Research Support Person of the Year Award for his contribution to MaizeGDB, the Corn Insects and Crop Genetics Research Unit, and the maize geneticists on all aspects of what it takes to make these programs operate successfully. <from GDCB homepage by Connie Garnett>

$563,501 from the National Institutes of Health to Thomas Bobik to study the molecular principles and develop an understanding of certain virus-sized subcellular structures called bacterial microcompartments.

$193,008 from the National Institutes of Health to W. Allen Miller, professor of plant pathology and director of the Center for Plant Responses to Environmental Stresses, to study how some viruses use a unique mechanism to avoid host defenses and take over the host's protein synthesis machinery.

"A predictable and potentially customizable kind of protein-DNA binding has been hard to find in nature. As Matt [Moscou] and I talked about the possibilities, we got excited and one of us said -- I don't remember who -- 'We've got to submit this to Science, dude.' --Adam Bogdanove, an associate professor in plant pathology. He, and student Matthew Moscou, were researching the molecular basis of bacterial diseases of rice when they discovered how a group of proteins from plant pathogenic bacteria interact with DNA in the plant cell. The results of their work will appear in an upcoming issue of Science.
Researchers at Iowa State University have found an essential key to possibly cure Parkinson's disease and are looking for others. Parkinson's disease sufferers lack a sufficient amount of a brain chemical called dopamine.

Anumantha Kanthasamy's research shows that there is specific protein that is naturally present in human brains that -- for no known reason -- kills the brain cells that make dopamine. The cells that are being killed are the ones that produce the needed dopamine. "We have millions of cells in our brains," said Kanthasamy, "In Parkinson's, about 10,000 of these brain cells die; no one knows why."

Kanthasamy discovered that a novel protein -- known as protein kinase-C (specifically PKCδ) - is killing the dopamine-producing cells. Kanthasamy and his research staff discovered a compound that neutralizes the cell-killing kinase-C and allows the dopamine-producing cells to survive and function. Now, Kanthasamy's group is looking for additional compounds that also can serve to neutralize protein kinase-C. By identifying more compounds that perform the function of neutralizing kinase-C, researchers are more likely to locate one that works well and has few side effects. The study is being funded by a Grow Iowa Values Fund grant. The goal of the grant program is to support development of technologies with commercial potential and to support the growth of companies using those technologies. Kanthasamy is working on this research with PK Biosciences Corp., an Iowa-based startup company. Funding was also provided by the National Institutes of Health. Everybody has a little Parkinson's in theory," he said. "But you can't see it until the level of dopamine gets too low." Dan Kuester, News Service, Iowa State University

$128,100 to Anumantha Kanthasamy, a Clarence Hartley Covault Distinguished Professor of Biomedical Sciences; and George Kraus, professor of chemistry and director of the Institute for Physical Research and Technology. They're working with PK Biosciences Corp. at the Iowa State Research Park to develop an effective neuroprotective drug for treatment of Parkinson's disease.

$107,680 to Bryony Bonning, professor of entomology; and W. Allen Miller, professor of plant pathology and director of the Center for Plant Responses to Environmental Stresses. They'll work with Pioneer Hi-Bred International Inc. to test a new transgenic technology designed to protect plants from insect pests.

Several animal science faculty members received awards at the annual American Society of Animal Science meeting held in Montreal this month. The Extension Award was presented to Daryl Strohbehn. Doug Kenealy was named the 2009 Fellow in the teaching category. The Meats Research Award was presented to Steven Lonergan. The meeting's program chair and vice chair were faculty members Leo Timms and Dorian Garrick, respectively.

Max Rothschild, Charles F. Curtiss Distinguished Professor in Agriculture and Life Sciences and director of the Center for Integrated Animal Genomics, has been named the 2009 recipient of the Distinguished Service Award by the American Agricultural Editors' Association. "Dr. Rothschild is one of the most recognized and productive swine genetics researchers in the world," said Maynard Hogberg, professor and chair of the of animal science department in his letter of nomination. The award will be presented at the Agricultural Media Summit in August.
Spinal Muscular Atrophy is the second-leading cause of infant mortality in the world. Ravindra Singh, associate professor in biomedical sciences at Iowa State University's College of Veterinary Medicine, would like to see Spinal Muscular Atrophy lose its high ranking and even slide off the list altogether. Most Spinal Muscular Atrophy sufferers -- more than 95 percent -- have a mutated or deleted gene called Survival Motor Neuron 1 (SMN1) that doesn't correctly do its job of creating functional SMN proteins. Singh's solution is to replace that poor-performing gene with another gene. Humans need a certain level of SMN protein to ward off Spinal Muscular Atrophy. When SMN1 fails to create functioning proteins, Spinal Muscular Atrophy is the result. There is a gene already in humans that looks very much like SMN1, so much so that it's called SMN2. The SMN2 gene doesn't seem to serve any function that researchers can identify. Singh has discovered a way of using SMN2 to produce the working SMN protein. When SMN2 makes enough SMN, it compensates for the mutated or malfunctioning SMN1 gene. "The significance of our work is that we have this stuff called junk DNA in SMN2," said Singh. "We found that we could get SNM2 to behave as SMN1 by introducing a small oligonucleotide. It is a very simple experiment if you think about it." The resulting proteins are normal just like a regular cell - free from Spinal Muscular Atrophy. Singh, along with his team Natalia Singh and Maria Shishimorova, both of Iowa State University's biomedical services department; Lu Cheng Cao, University of Massachusetts Medical School, Worcester; and Laxman Gangwani, Medical College of Georgia, Augusta, have their research highlighted as the cover story on this month's issue of the journal RNA Biology. Their research is the most downloaded story on the RNA Biology page of the Web site Landes Bioscience.

A short and smart oligonucleotide: A short antisense oligonucleotide (3UP8) targeting a specific intronic sequence corrects aberrant splicing of Survival Motor Neuron 2 (SMN2) and restores high levels of functional SMN protein in patient cells of spinal muscular atrophy (SMA). Prominent green dots (see in "SMN section") represent well-organized SMN bodies (gems) in the nucleus of the 3UP8-treated cells (bottom two panels). Gem contains another protein ZPR1 (see red dots in "ZPR1 section") that co-localizes with SMN protein in the nucleus of the cell (see white dots in "Merge section"). Dan Kuester, News Service, (515) 294-0704, kuester@iastate.edu 07-27-09

Martin Spalding, genetics, development and cell biology department, recently talked to GENcast Network, a Web site that specializes in genetic engineering and biotechnology news. Spalding was interviewed about his research that could accelerate the use of microalgae in the production of biofuels. More: http://www.genengnews.com/genCasts.aspx?id=263
Researchers at Iowa State University have discovered a previously unknown pathway in plant cells that regulates plant growth. Yanhai Yin, an assistant professor in genetics, development and cell biology, examined signaling mechanisms of a plant hormone called brassinosteroids. The hormone controls the growth of cells. The brassinosteroids (BRs) have a major impact on how large the plant grows, says Yin. "Previously, we knew that steroids promote growth," said Yin. "In model plants like Arabidopsis (a relative of mustard) and crops such as corn and rice, if you have more steroids, you have more growth, and if you have less steroids, you have less growth and the plant is smaller." Now Yin knows that the HERK1 (named for Hercules -- the Greek and Roman god who possessed superhuman strength) pathway, induced by BRs, is controlling much of that growth. Yin and his team's findings are in the May 5 edition of the journal Proceedings of the National Academy of Sciences of the United States of America. There are many other internal and external factors such as light, nutrition and hydration that effect plant growth, but the HERK1, along with some unknown signals, have a great effect. Yin and his team of Hongqing Guo, assistant scientist; Lei Li, Huaxun Ye, (genetics graduate students) and Xiaofei Yu, all graduate students; and Alexandria Algreen, undergraduate student; have shown that by over-expressing HERK1, they were able to increase a plant's size by 10 to 15 percent. By under-expressing HERK1, the plants were about 50 percent smaller. Understanding what make plants get bigger could be a critical component when producing grain and bio-mass for biofuels. "With that knowledge, maybe we have one more tool to manipulate corn and rice if we want more grain, or if we want more mass for bio-energy crops," Yin said. Dan Kuester, News Service, (515) 294-0704, kuester@iastate.edu

You have this divergence - this lineage splitting into two lineages that for thousands and then millions of years are evolving in isolation. You like to think of their 40,000 genes all working in this beautiful 40,000-part harmony together in development and reproduction. And yet, they acquire different lifestyles, and different morphologies -- maybe they're on different continents -- and then you put them back together: this wonderful biological reunion. They get slammed back together in the same nucleus and only one of two parental cytoplasms, because of hybridization, and in the case of polyploidy, there's genome doubling. And there's this huge black box. What happens? 40,000 now-duplicate genes? and why is this evolutionarily successful? Why is it so common? It's a fantastic mystery. --Jonathan Wendel, ecology, evolution, and organismal biology, describing the research paper he co-authored on the genetic expression of flowering plants (Genome expression dominance in allopolyploids, BMC Biology, May 1, http://www.scientificblogging.com/print/53133)

Several new patents have been issued this spring to faculty in College departments. They include: - Joel Coats and Junwei Zhu, entomology, for Biorational Repellants Obtained from Terpenoids for Use Against Arthropods; Basil Nikolau, biochemistry, biophysics and molecular biology, and Patrick Schnable and Tsui-Jung Wen, agronomy, for Materials and Methods for the Alteration of Enzyme and Acetyl CoA Levels in Plants; and - Reuben Peters, biochemistry, biophysics and molecular biology, for Identification of Syn-copalyl Diphosphate Synthase.

Several College students were honored April 5, 2009, at the Alumni Association's annual Student Scholars and Leaders Recognition Ceremony. College faculty and staff for providing exceptional support, including: Matt Helmers, agricultural and biosystems engineering; Mike Retallick, agricultural education and studies; Bradley Miller, agronomy; Allen Trenkle, Curtis Youngs, Steven Lonergan, Matthew Ellinwood and Nikki Ferwerda, animal science; Christopher Chandler, ecology, evolution and organismal biology; Terry Alexander, Ronald Deiter, John Lawrence, Ebby Luvaga, James Kliebenstein and Quinn Weninger, economics; Bryony Bonning and Ken Holscher, entomology; Jennifer Walker-Daniels, food science and human nutrition; Clark Coffman, genetics, development and cell biology; Barb Osborn, horticulture; and Mike Gaul, career services.
The U.S. Department of Agriculture has awarded competitive grants to Iowa State University for projects in animal genomics research and extension. The three Iowa State projects were awarded grants through the National Research Initiative Animal Genome Program, which seeks to develop sound, practical, science-based knowledge that can be shared with other researchers, farmers and consumers of U.S. animal products. The grants totaled $1.7 million. The Bioinformatics to Implement Genomic Selection project will develop Web-accessible software for statistical analysis of genomic data in beef cattle to provide breeders with information to increase the likelihood of selecting young livestock with desirable production traits. The project’s research team includes principal investigator Dorian Garrick, and Jack Dekkers and Rohan Fernando, all from the animal science department, and Dan Nettleton, statistics department. Another project will examine the immune response of pigs to salmonella bacteria with the goal of genetically identifying animals with greater immunity to reduce the shedding of the bacteria in manure at the farm. Chris Tuggle, animal science, is the researcher leading the Developing Predictive Models for Identifying Pigs with Superior Immune Response and Improved Food Safety project. His collaborators at Iowa State include Dan Nettleton, statistics; Michael Wannemuehler, veterinary microbiology and preventive medicine; Vasant Honavar, computer science; Annette O'Connor and James McKean, veterinary diagnostic and production animal medicine; as well as scientists at USDA’s Agricultural Research Service labs in Ames, Shawn Bearson, and in Beltsville, Md., Joan Lunney. Another grant will help support a symposium for experimental and computational scientists and engineers on systems biology, which is the study of complex interactions in biological systems. Drena Dobbs, genetics, development and cell biology; Marit Nilsen-Hamilton, biochemistry, biophysics and molecular biology; and Chris Tuggle, animal science, are organizing the symposium, which will feature 19 speakers June 11 to 14 from across the United States and several foreign countries.

An Iowa State University faculty member is part of an international team that mapped the cattle genome. James Reecy, director of the Office of Biotechnology and associate professor of animal science, took part in the annotation portion of the mapping project that manually examined the computer-generated genetic sequencing. The group's findings are being published in the current edition of the journal Science. In the past, animal genome sequencing has focused mostly on small animals, such as rat and dog. "This is the first time cattle were sequenced for a whole genome assembly," said Reecy. "It is important that we have the entire genome for a large animal." The research was funded in part by the National Institutes of Health, which was interested in how this sequencing could help understand the previously mapped human genome. "It was very beneficial for humans," said Reecy. "We found a new gene sequence in cattle that hadn't been seen in humans, which helped us to improve the annotation of the human genome." The grouped mapped the genome of Taurine cattle, or non-humped cattle, which includes many breeds such as Angus, Shorthorn and most other beef and dairy breeds that are common to colder weather areas such as North America and Western Europe. Cattle were chosen by researchers to be mapped because the species fills a need in the list of animals that can help understand animal and human genes. Mapping cattle also helps fill in needed information in the evolution of different species. Cattle fit a unique evolutionary group. That, along with the agricultural benefit is why the species was chosen, said Reecy. That benefit for farmers includes the possibility of learning more quickly which genes are associated with which traits of importance in cattle. "We can increase the efficiency with which we can say, 'This gene is associated with this trait.'" said Reecy. "This will help us answer questions like, 'Can we improve milk production? Can we improve the healthfulness of beef?' This will allow us to do things quickly that otherwise would have taken us years." The lead researchers for the project were from Georgetown University, Washington, D.C.; Baylor College of Medicine, Houston, Texas; and Commonwealth Scientific and Industrial Research Organization, Australia; and was funded partially through the United States Department of Agriculture, CSIRO and National Cattlemen's Beef Association.
Increasing levels of carbon dioxide in the atmosphere are a concern to many environmentalists who research global warming. The lack of atmospheric carbon dioxide (CO2) concentration, however, actually limits the growth of plants and their aquatic relatives, microalgae. For plants and microalgae, CO2 is vital to growth. It fuels their photosynthesis process that, along with sunlight, manufactures sugars required for growth. CO2 is present in such a limiting concentration that microalgae and some plants have evolved mechanisms to capture and concentrate CO2 in their cells to improve photosynthetic efficiency and increase growth. An Iowa State University researcher has now identified one of the key proteins in the microalgae responsible for concentrating and moving that CO2 into cells. "This is a real breakthrough," said Martin Spalding, professor and chair of the department of genetics, development and cell biology. "No one had previously identified any of the proteins that are involved in transporting CO2 in microalgae." The main protein that Spalding and his team have identified that is responsible for transporting CO2 is called HLA3. The research by Spalding; Deqiang Duanmu, a graduate student in Spalding's department; and Amy Miller, Kempton Horken and Donald Weeks, all from the University of Nebraska, Lincoln; is published in the current issue of the journal Proceedings of the National Academy of Sciences of the United States of America. Now that the HLA3 protein has been identified, Spalding believes there are several possibilities to use the gene that encodes this protein. The recent explosion of interest in using microalgae for production of biofuels raises the possibility of increasing photosynthesis and productivity in microalgae by increasing expression of HLA3 or other components of the CO2 concentrating mechanism, according to Spalding. Since all plants need CO2 to thrive, introducing the HLA3 gene into plants that do not have the ability to concentrate CO2, could help those plants grow more rapidly. Spalding says several plants would be candidates for the HLA3 protein. "One of the things we've been working on is the prospect that we may be able to take components of the CO2 concentrating mechanism for microalgae, such as this HLA3, and put it into something like rice and improve photosynthesis for rice," said Spalding. Rice and other commodity crops such as wheat and soybeans do not have any CO2 concentrating mechanism. Dan Kuester, News Service, 515-294-0704, kuester@iastate.edu 4/8/09

On Monday, Nov. 2, an international team of scientists, including Max Rothschild, announced that the first draft of the genome of a domesticated pig was completed. The University of Illinois led the project. ISU’s Rothschild was one of the team’s co-directors, who were based at seven institutions in four countries.

“Besides improved pork products, the sequence, or DNA structure, of the pig genome may yield new information important to human health. You can’t pick a better model for studying human diseases than the pig. A deeper understanding of the pig genome should translate into enormous opportunities for treating obesity, diabetes, heart disease and other problems, said Rothschild.”

The $24.3 million public-private partnership was funded by the USDA’s National Institute of Food and Agriculture as well as funding and technical support from many others, including Iowa State University and the Iowa Pork Producers Association. Iowa State is using genetic sequences identified in the genome project to hunt down genes important for reproduction, feed efficiency, growth rate and disease resistance. Brian Meyer, Agriculture and Life Sciences Communication
Grants from the National Science Foundation and U.S. Department of Agriculture worth $3.15 million are supporting a new study about the tuberization of potatoes that's taking root at ISU. Professor of horticulture David Hannapel is leading the NSF-funded project and co-leading the USDA-funded project with professor Aragula Rao, chair of ISU’s biochemistry, biophysics, and molecular biology department. "Tuberization in potatoes is particularly intriguing as it involves the delivery of a light signal from the light-receiving organ, the leaf, to an underground organ, the stolon," Hannapel said. "The overall scientific objective of these projects is to uncover the network of signals that is responsible for the light-activated process of tuber formation."

Plants receive environmental signals that activate molecular pathways to control defense, development and metabolism, Hannapel said. The length of daylight is a key environmental signal that regulates flowering, dormancy and tuberization of the potato. “The overall scientific objective of these projects is to uncover the network of signals that are responsible for the light-activated process of tuber formation.” Hannapel said recent discoveries have demonstrated the role of a mobile RNA in a signaling system that activates tuber formation. RNA, ribonucleic acid, is a molecule present in all living things that plays a part in protein production and transmitting genetic information. “Full-length mobile RNAs that move long distances in plants and act as signals for development and defense are a novel idea in plant biology. The value of our work is that it provides a model for understanding how such signal RNAs are moving and what determines their final destination,” Hannapel said. Ed Adcock, Agriculture and Life Sciences Communication Service.

An etched glass mural titled “River of Milk” has been installed at the Iowa State University Dairy Farm’s visitor’s center. “The mural blends together dairy production, science and how the two work together to improve the dairy industry,” said Diane Spurlock, animal science associate professor, adding that the dairy farm is used for research, education and extension and outreach.

Spurlock was the model for an image of a woman scientist in the mural. A herdsman with a calf was modeled after “Superman” actor Christopher Reeves. The artist, glasswork architect Michaela Mahady from Pegasus Studio of Minneapolis, used pictures of Spurlock and Reeves when she designed the mural. Both figures are etched onto the side windows between the visitor’s center and the milking parlor. Six major dairy breeds are etched onto the top part of the glass windows, with the focus on a design replicating ISU artist-in-residence Christian Petersen’s sculpture known as “History of Dairying,” which was completed in 1934 in Iowa State College’s Dairy Industry Building, now known as the Food Sciences Building.

“We gave Mahady pictures and books about the five dairy breeds,” Spurlock said “We wanted the work of art to be something dairy producers would
appreciate.” Engraved into a marble border below the mural is the word “milk” written in 27 different languages. “We wanted to represent the international importance of milk and the dairy industry,” Spurlock said. Inspiration for the mural began when the Art in State Buildings committee for the dairy farm began meeting in 2005 and chose Mahady as the artist. As part of the Art in State Buildings legislation, one-half of 1 percent of funds used to construct a facility is required for public art. “River of Milk” joins more than 600 works of public art in the Iowa State University Art in Campus Collection. ISU Communication Service News Releases January 28th, 2009  Laura Rosenbohm

● **Steven Whitham**, associate professor in plant pathology, received the Mid-Career Achievement in Research Award from the College of Agriculture and Life Sciences at Iowa State University on February 16, 2009.

● **Lisa Nolan**, College of Veterinary Medicine, to associate dean for research and graduate studies

● **James Reecy**, associate professor of animal science at Iowa State University, will become director of the university's Office of Biotechnology on July 1. Reecy will transition into the position by becoming the associate director on April 1. In addition to his new role, Reecy will continue his research and teaching in the department of animal science. As part of his new responsibilities, Reecy will assume a leadership role in initiatives to help Iowa State adapt to the changing nature of biotechnology as the discipline evolves and expands. These initiatives include hiring outstanding faculty researchers, providing outstanding service facilities that meet the needs of Iowa State researchers, promoting the public's understanding of biotechnology, and developing new strategies to maintain the university's leading role in biotechnology research, outreach and technology transfer. Reecy joined Iowa State University in 1999. Since then, his research has focused on the molecular and quantitative genetics of beef cattle, as well as early heart development, skeletal muscle growth and livestock bioinformatics. Reecy's interest in developing bioinformatics resources for livestock led to his appointment by the U.S. Department of Agriculture as its national bioinformatics coordinator. For more about the Iowa State University Office of Biotechnology, see [www.biotech.iastate.edu](http://www.biotech.iastate.edu).

Dr. Reecy spent a year studying bioinformatics of genomes at the Wellcome Trust Sanger Institute near London. *Photo (left) by Bob Elbert.* The Sanger institute, a world leader in cataloging animal genomes, is located about 40 miles north of London, near Cambridge.

Reecy's charge at the institute was to find out more about genome annotation and bioinformatic analysis of genomic sequence to help him as coordinator of the bioinformatics coordination program of the USDA and the Cooperative State Research, Education and Extension Service.

The year in England helped Reecy better understand the information resources the institute can provide, and also the limitations. "We are trying to learn more about bioinformatic analysis of genome data," said Reecy. "We are learning how to handle the genome sequences and what questions to ask.  Dan Kuester, News Service
Jeanne Serb, Ecology Evolution and Organismal Biology, has nothing against vertebrates but she will never work with them again. “Invertebrates are much more complex and beautiful. And have such strange behaviors. Can I show you a movie?” Serb turns to her computer and plays a clip of scallops flitting back and forth in murky water. “Look how they clap their shells as they move. They remind me of those novelty wind-up teeth that walk. They really book. I love mollusks.”

Research funds are available because mollusks are great models for understanding human health issues like eye diseases. With mollusks, she earned her Ph.D. at the University of Alabama. At Iowa State, Serb is funded by the National Science Foundation to study how complex traits like the eye evolved in scallops. What she learns may shed light, literally on our understanding of the human eye. The scallop eye is a unique model to study eye formation and evolution,” Serb says. “Scallops have an image-forming retina and two kinds of photoreceptors, the cells that change light into chemical reactions that inform the brain. If a scallop loses an eye, it regenerates it. That’s an exciting prospect that could directly inform how we look at human vision problems.” But why do scallops even have eyes? Most bivalves don’t, Serb says. But scallops have a hundred gorgeous peepers. An extreme closeup of the rim of a scallop shell looks like a Salvador Dali painting. They eyes look like a series of giant blue olives balanced on a mountain range.

“There are genetic mechanisms, like the eye, that up to a point are common across all animal species. I want to know where the point of differentiation begins that has led to a fly’s compound eye, a scallop’s 100 blue eyes, the camera-type eyes of a fish or our human pair,” Serb says. In a project supported by ISU’s Center for Integrated Animal Genomics, Serb and colleagues in veterinary medicine and computer engineering are comparing the genomes of flies and mice to better understand photoreceptor cells. When photoreceptor cells fail or die, serious vision diseases result. Retinal degenerative diseases, like macular degeneration, are a leading cause of blindness worldwide. As the U.S. population continues to age, it’s estimated that macular degeneration will blind more people than all other retinal diseases combined. “We’re looking for similarities between genes in the fly and mouse genomes to see if we can fill in gaps in our knowledge,” Serb says. “It’ll help scientists begin thinking about creating or saving the receptors in people who are losing their vision.”

Serb says evolution is like an editor working on drafts. Each subsequent draft leaves behind unneeded words, sentences and paragraphs. “If certain combinations of genes don’t work, the editor gets out the red pencil and puts an “X” through it. Over time, the DNA language that’s spared the editor’s severity makes up genetic conservation. For me, the eye is a good model to study genetic conservation and use that knowledge for the good of human health.” STORIES College of Agriculture and Life Sciences Fall 2008.
Researcher Paul Scott holds corn kernels created with the GFP technology (yellower kernels) interspersed with normal corn.

Geneticist Paul Scott, who works in the U.S. Department of Agriculture’s Agricultural Research Service Corn Insects and Crop Genetics Research Unit based at ISU; Lawrence Johnson, director of the Center for Crops Utilization Research; Kan Wang, director of the Plant Transformation Facility; Charles Glatz, professor of chemical and biological engineering and former interdepartmental genetics graduate student Colin Shepherd, teamed up for a corn project.

When corn is milled, or ground, its three primary tissues combine. That complicates matters for end-users who want separate parts, such as the protein- and oil-rich part for feed or the starch for making alcohol. Scientists developed tissues markers for transgenic corn lines using green fluorescent protein. The scientists incorporated the GFP markers into either the embryo or the endosperm and used a device that measured lightwave emissions from the fluorescent corn tissues. One corn line’s endosperm contained 100% of the GFP fluorescence.

After hand-dissecting the transgenic kernels and identifying GFP concentrations in the pericarp, embryo and endosperm tissues, they had baseline levels to use for identifying different tissues during the fractionation, or milling, process. The researchers determined GFP fluorescence levels for each part by being able to easily identify the mix of tissues in each. “The GFP technology has revolutionized biology,” Scott said. “It helps us understand how transgenes function and allows us to implement transgenic technology in a safer way.” He expected it will expand knowledge about how corn genes interact with genes introduced into corn plants. ISU News Release December 2008 Brian Meyer, Agriculture and Life Sciences Communication Service.


● Ames, Iowa  Vibe: Wholesome Americana
Population: 55,000
Median housing price: $159,270
Average commute: 17 minutes
Average number of sunny days: 202 per year
Most relaxing way to spend an afternoon: Paddling a canoe in Ada Hayden Heritage Park, where you may spot—besides hundreds of common birds—a short-eared owl or a summer tanager
Simple fun for less than $10: Touring Reiman Gardens at Iowa State University, where $7 ($6 for seniors) buys access to award-winning rose gardens and more
Who knew?: It recently ranked as the sixth-smartest city in the United States.

Ames is a gracious town—with broad lawns, leafy neighborhoods, pretty parks and ponds—and its distinctly rural flavor is the key to its urban charm. With its thrice-weekly farmers' markets, paddling options on the Skunk River, and 55 miles of city-maintained trails for avid bikers, runners, and walkers, Ames is a place for people who like wide-open spaces. "You can drive less than five minutes outside of town and you are really in the country," says Russ Cross, 53, a bank executive in Des Moines, 30 miles away. The lively downtown area—including a long Main Street, fun restaurants (such as favorite Aunt Maude's, serving up local meats, cheeses, and produce), and a pub with its own brew—adds to the charm. "I love that when I step outside my office on Main Street, it's such a clean little town," says Russ's wife, Beth, 51, president of a local marketing company. "It's one of the most welcoming places I've ever seen." The couple, who like to run on Ames's trails with their golden retriever, say they are a long way from retiring, but when they do, they can't imagine moving anywhere else. "There's just so much that I want to do right here," Beth says.

● NOTE FROM Linda
Hi. I finally finished a BS in biology this summer. I managed to escape without the 2nd semester of organic chemistry; I think they were glad to have me finish since my status as 12-year senior was skewing their statistics. No more classes!! Except …….there are a couple of Geology courses this spring that look really interesting. As someone who loves dinosaurs, a course in Geologic Disasters sounds like fun.
I discovered FACEBOOK this fall and found most of my nieces and nephews were up there and a bunch of cousins. My oldest brother tells me daily how wonderful retirement is.
I took my dog to the new Ames dog park this summer and fall. I think I like it better than she does. But she can walk off lease without my worrying about cars or other dangers like “squirrels!”

Facebook  The IG program has a Facebook page if you would like to become fans. You will find us at the if you search for “Genetics Graduate Program at Iowa State University.” I am still unsure as to what we are going to do with it, but do feel free to write there if you wish.
IG PROGRAM NEWS

The IG Curriculum Committee met this past year and recommended changes to the IG Curriculum, our first core curriculum change in our 17 years of existence. It was recommended that students take a bioinformatics course as part of the IG core courses. The faculty discussed adding to course expectations and decided that since BBMB 404 and STAT 401 were undergraduate courses, that new students entering the program beginning Summer 2010 would be encouraged to take upper level biochemistry and upper level statistic courses prior to beginning their graduate education. Students who arrive without this preparation will take BBMB 404 (Biochemistry I) and STAT 401 (Statistics for Research) in addition to GDCB 510 (Transmission Genetics), GDCB 511 (Molecular Genetics), a course selection from the Genomics, Bioinformatics and Statistical Genetics core area, and a course selection from Evolution, Population and Quantitative Genetics core area. The IG Curriculum Committee will review undergraduate transcripts and determine whether entering students have met the upper level biochemistry and upper level undergraduate statistics course requirements. For more detailed info: http://www.genetics.iastate.edu/curriculum.html

Graduation: Students completing degrees this year from the program include: Suzanne McGaugh (Ph.D./Janzen Lab/EEOB), Ryan Rapp (Ph.D./Wendel Lab/EEOB), Mariana Chiozza (M.S./MacIntosh Lab/Entomology), Xia Zhou (MS/Rothschild Lab/Animal Science), Suh-Yeon Choi (Ph.D./Wurtele Lab/GDCB), Allison Pappas (Ph.D./Nilsen-Hamilton Lab/BBMB), Ruth Swanson Wagner (Ph.D./Schnable Lab/GDCB), Ramesh Kounkuntla (Ph.D./Link Lab/GDCB), Heather Babka (Ph.D./Wurtele Lab/GDDB), Chuanhe Yu (Ph.D./Genetics/Tom Peterson), Carlie (Peck) LaLone (Ph.D./Genetics/Birt), Melissa (Feile) Hillwig (Ph.D./Genetics/MacIntosh) and Lex Flagel (Ph.D./Wendel Lab/EEOB).

Interesting Statistics: Total Genetics (IG) degrees awarded between 1992 and Summer 2009 are: 88 MS degrees and 109 Ph.D. degrees. We have 11 alumni employed by Monsanto, 2 who are genetic counselors, 3 who are patent attorneys, 2 at Mayo Clinic (MN), 3 employed by USDA and 9 employed by Pioneer Hi-Bred International. Alumni are faculty at Cornell University, Des Moines Area Community College, Morningside College (IA), Ewha Women's University (Korea), Boise State, Tuskegee University, Yeungnam University (Korea), Pochon CHA University (Korea), University of Alabama (2), University of Tennessee, University of Nebraska, University of Texas, University of Louisiana, University of North Carolina, and Seoul National University (Korea). We have alumni employed as research scientists, post docs, and at biotechnology corporations like Mendel Biotechnology Inc., CSIR Biosciences, diaDexus Inc. and Syngenta. Some M.S. students are now seeking Ph.D.s.

New Students Summer and Fall 2009. IG recruited 12 new students for summer and fall 2009. Six students are domestic and 6 students are international; 8 students are participating in rotations. Domestic students came from Iowa State University (2), Middle Tennessee State, Knox College (IL), Virginia Commonwealth, and University of Northern Iowa. International Students received their undergraduate degrees from University of Northern Iowa, West Bengal University of Technology (India), Presidency College (India), Central South University (China), Jawaharlal Nehru Technological University (India), and Kyungpook National University (Korea). We presently have 104 genetics graduate majors in the program; 43 domestic students, 61 international students; 6% from under represented groups (14% of the domestic students); 57% female, and 43% male. We are proud of our efforts to diversify science.

Recruitment for 2010. We plan to recruit 8 to 12 new students for 2010. We have made one offer as of November 1, 2009. We are especially looking for domestic students interested in animal statistical genetics research. We always have room for plant geneticists. If you know of some good potential students, please ask them to take a look at our program. Application information can be found here: http://www.grad-college.iastate.edu/programs/APresults3.php?apnumber=109