



IGB NEWS

Achievements, awards, and information about the IGB community

Volume 5, Number 6



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{Upcoming Events}

IGB Seminar

October 16, 2012 12:00 p.m.
612 Institute for Genomic Biology

Sarah C. Williams
*Life Sciences Data Services Librarian
and Associate Professor*

Sarah L. Shreeves
*Coordinator of IDEALS & the Scholarly
Commons and Associate Professor*

“Data Plans for NSF and NIH Grants”

Pioneers in Genomic Biology Lecture Series

October 23, 2012 12:00 p.m.
612 Institute for Genomic Biology

Andreas Meyer-Lindenberg, MD, PhD
*Director, Central Institute of Mental Health
Clinical Director, Clinic for Psychiatry
Professor and Chair, Department of Psychiatry and
Psychotherapy, University of Heidelberg*

**“Brain Mechanisms Mediating Genetic and
Environmental Impact on Behavior in Humans”**

IGB Halloween Party

October 25, 2012 4:00 p.m.
612 Institute for Genomic Biology

IGB students, faculty, affiliates, staff, and families
welcome! Prizes awarded for best costume.

IGB Seminar

October 30, 2012 12:00 p.m.
612 Institute for Genomic Biology

Steven C. Almo, PhD
*Professor, Departments of Biochemistry,
Physiology and Biophysics
Albert Einstein College of Medicine of Yeshiva
University, New York*

**“High-throughput Approaches to Structure,
Function, and Immunity”**

Genome Day

November 3, 2012
1:00 p.m. — 5:00 p.m.
Orpheum Children’s Science Museum
346 North Neil, Champaign

A day to educate all ages about genomes, genes, and
DNA! Free and open to the public.

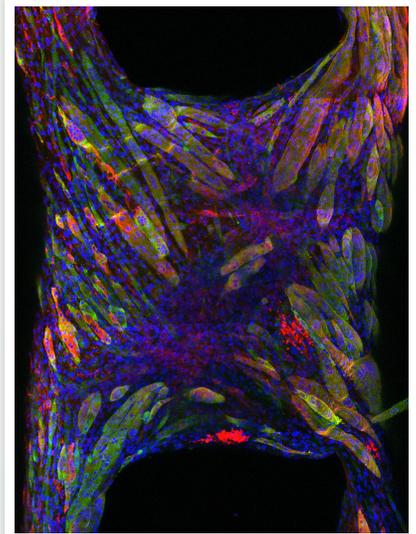
IGB Seminar

November 6, 2012 12:00 p.m.
612 Institute for Genomic Biology

Melanie Loots
*Executive Associate Vice Chancellor
University of Illinois*

**“Required Training and Disclosure for NIH and
Other PHS Researchers”**

{Image of the Month}



This month’s image, “Progenitor cells fusing
and differentiating into contractile skeletal
muscle tissue,” is courtesy of Vincent Chan
from Rashid Bashir’s group, Micro and
Nanotechnology Laboratory.

The image was taken with the Zeiss LSM
710 Multiphoton Confocal Microscope.

IGB News

Share your news with the IGB. Send your
story ideas to nvasi@illinois.edu

5-Year NASA-Funded Research Grant Awarded

The University of Illinois at Urbana-Champaign has been selected as one of five new research teams joining the NASA Astrobiology Institute (NAI) to study the origin and evolution of life, on a five-year grant totaling approximately \$8 million.

Nigel Goldenfeld, Swanlund Professor of Physics and leader of the Biocomplexity research theme at the Institute for Genomic Biology, will serve as the principal investigator. The goal is to characterize the fundamental principles governing the origin and evolution of life anywhere in the universe. This multidisciplinary effort to define and characterize “universal biology” will include the fields of microbiology, geobiology, computational chemistry, genomics, and physics.

Nigel Goldenfeld explains: “So what is universal biology? Looking at a modern computer, say a smartphone, compared to the first room-sized computers it’s hard to believe they are the same machine. Yet they are all examples of universal computation. What now are the analogous general principles for living, evolving organisms? Beyond speculation, can we actually test out theories with real data? Modern genomics provide the data and tools to examine carefully the evolutionary relationships between parts of the cell. And even further, theory gives us a clear hypothesis to test: namely that early life was a commune, and indeed had to have been, based on general universal biology considerations related to the detailed structure of the genetic code.”

The Illinois team will use genomics to explore deep evolutionary time, looking for signatures of early collective states of life. The group will also perform laboratory work to study in detail how individual cells sense, respond and adapt to changing environments. Lastly, the project will look for signatures of the major transitions that life must make as evolution changes character from being communal to the modern era where there are traceable individual organismal lineages.

“We want to help answer not only the basic questions of ‘How does life begin and evolve?’ and ‘Is there life beyond Earth?’ but also ‘Why does life exist at all?’”

“It is important to develop the field of universal biology, because we may never find traces of life on other planets. But if we understand that life is generic, maybe even an expected outcome of the laws of physics, then we’ll know for sure that we are not alone,” Goldenfeld says.



» Members of the new Illinois NASA Astrobiology Institute research team, from the Institute for Genomic Biology’s Biocomplexity research theme.

Top row, from left: Lee DeVille, Nigel Goldenfeld, Charles Werth

Bottom row, from left: Isaac Cann, Rachel Whitaker, Elbert Branscomb, Carl Woese, Bruce Fouke, Zan Luthey-Schulten, Rod Mackie. Not pictured: Gary Olsen

Co-investigators on the research team include Elbert Branscomb, Isaac Cann, Lee DeVille, Bruce Fouke, Rod Mackie, Gary Olsen, Zan Luthey-Schulten, Charles Werth, Rachel Whitaker, and Carl Woese from Illinois, Scott Dawson from the University of California, Davis, and Philip Hastings and Susan Rosenberg from Baylor College of Medicine, in Houston.

The research will be based in the university’s Institute for Genomic Biology. “This bold research program fits perfectly at the IGB, which was established to help faculty compete for the

theme, the IGB, and the campus as a whole.”

In addition to the research, novel educational activities related to the field of astrobiology will take place. These will include not only formal education in astrobiology at the undergraduate level, but also a massively online open course as part of the university’s initiative in this arena. Other public outreach will include a partnership with a science program at the middle school science level, the development of short web-based videos on astrobiology concepts and findings called “AstroFlix”, and a new astrobiology course for lifelong learners in the community.

Goldenfeld concludes “We want to help answer not only the basic questions of ‘How does life begin and evolve?’ and ‘Is there life beyond Earth?’ but also ‘Why does life exist at all?’ The NASA Astrobiology Institute is the most far-sighted attempt to address foundational questions that everyone asks at some time in their life. We are thrilled to participate with them in perhaps the most important questions in all of science.” ■

large grants that are necessary to address grand challenges with a team-based multidisciplinary approach,” says Gene Robinson, Director of the IGB. “The NASA award reflects the creativity and vision of the faculty in the Biocomplexity research

Lisa Ainsworth: Improving Crop Yield in the Face of Climate Change

What makes some crops, like soybeans and other legumes, more or less sensitive to increased ozone levels, Lisa Ainsworth wonders, and how can we develop more resistant strains?

Ainsworth, an affiliate of IGB's Genomic Ecology of Global Change research theme, studies the effects of ozone on soybeans and other legumes. Unlike the ozone layer in the upper atmosphere, ozone at the ground level is a pollutant. Plants are particularly sensitive to it. They age more quickly when exposed to excess ozone and at high concentrations they get necrotic spots or bronzing. Ozone's effects are challenging to study because it is short-lived and levels vary from day to day and season to season.

"Ideally we'd love to find something that tells us when plants are very young whether they are tolerant or sensitive to ozone," says Ainsworth, associate professor of plant biology, and a member of the USDA-ARS (Agricultural Research Service) Global Change and Photosynthesis Research Unit. "The reality is we have not found that yet."

Instead, Ainsworth uses genomic tools to tease apart the genetic basis of ozone response. She has embarked on the first large-scale screening experiment of ozone-tolerant soybeans, developing 200 lines with a broad range of tolerance levels. Using these lines she will identify regions of the genome, quantitative trait loci (QTL), that are linked to tolerance differences.

From previous work, researchers already have some idea of which genes are changing in expression with different ozone levels, "so if those line up with the QTLs we've identified, that is strong evidence that we're getting close to genes critical for tolerance," she says.

Once those genes are identified, Ainsworth and others can either breed or transgenically make more ozone-tolerant lines.

Ainsworth's lab also has had an intriguing result from a set of experiments comparing the tolerance of five different legume species (one genotype per species). Ainsworth's group found that, across all five species, pea was the most tolerant. It was not

damaged; its growth response was not altered even when grown in 100 ppb ozone. It appears that the pea massively upregulated its recycling of glutathione, a metabolite that quenches reactive oxygen species (which ozone, among other things, is).

"This appears to be the way the pea tolerated a level of ozone that caused a 30% decrease in photosynthesis in soybean and 50% in common bean," says Ainsworth. "That's a really interesting clue to maybe a pathway we can manipulate in soybean to make it more ozone tolerant."

Ainsworth came to this work naturally; farming is in her blood. She grew up in Mason City, 90 miles from Champaign-Urbana, and her Illinois roots go deep. She is the sixth generation of her family to be involved in farming in Illinois. Her great-great grandfather, W.T. Ainsworth, established the W.T. Ainsworth Seed Company in 1908, and in 1941 her grandfather, Ralph Clayton "Doc" Ainsworth started his own hybrid seed company, which was subsequently run by her father, Thomas C. Ainsworth.

She is experiencing her own kind of success in the field. This year Ainsworth was honored with the Charles Albert Shull award from the American Society of Plant Biologists for her research on current and future impacts of global and environmental change on plant ecosystems. The award is given to an early career scientist.

Among other things, the award recognized the highly cited work she did as a graduate student and post-doc synthesizing all the primary research to date on plant responses to rising CO₂ and ozone. That required reviewing thousands of papers, pulling data, putting it in a database and then re-analyzing it.

Some of her findings, published in a 2005 Science paper, showed that when plants are grown in chambers the yield response to high CO₂ is much greater than when grown in the field. This means if scientists are using predictions for chamber experiments to model future crop production they are over estimating yield.

"Our results were controversial, but we reported what the data showed," says Ainsworth, who found that if CO₂ is elevated to 550 parts per million (ppm), yields of soybean, rice and wheat increase only 15 percent.

"The slight yield increase in response to high CO₂ won't counter the effects of high temperature, drought and increasing extreme weather. That was a major point we made," she says.

Of the Schull award she says, "I was very pleased to receive it. It was an especially meaningful honor to get it this year because Steve (Long) also was awarded the Charles Kettering meritorious award



» Lisa Ainsworth works to develop more climate resistant strains of crops such as soybeans.

for work in photosynthesis at the same award ceremony."

Ainsworth came to the University from UCLA for her PhD in crop sciences and worked with Stephen Long, professor of crop sciences and deputy director of the Energy Biosciences Institute. After a two-year post-doc in Germany, Ainsworth returned to campus to take her current position in the Global Change and Photosynthesis Research Unit of the USDA-ARS and member of the plant biology department.

She couldn't be happier with the dual appointment.

"I don't know that there are many places with people as willing to collaborate and be supportive and collegial," she says of the University. "I always felt that it was a very supportive environment. It's a real luxury to live in a world like that. And here we do. That is unique."

And being part of the USDA means her work is very much mission driven, which she also appreciates.

"ARS tries to solve the major problems in the ag industry. It's exciting to do that from the middle of the corn belt," she says.

One major problem is how to maintain or increase crop yield in the face of climate change.

"We need to start investing more in developing crops for the future, that is where my research is aimed," she says. ■

Recipients Announced for the 2012 Institute for Genomic Biology's Proof of Concept Initiative

The Institute for Genomic Biology is happy to announce the award recipients in the 2012 IGB Proof of Concept (POC) Initiative. There is a well-known funding gap between basic laboratory research and the resulting commercial products. Proof of Concept (POC) funding has proven to be a crucial element in bridging this so called "valley of death" between research and development. The goal of POC funding is to "de-risk" an invention such that the technology is more attractive for either (1) licensing to an existing company or (2) enabling the formation for a startup company that will raise money and further develop and commercialize the technology. Ensuring transformative research has the opportunity to positively impact the world through commercialization is a critical part of the IGB's mission of advancing life science research and stimulating bioeconomic development in Illinois. In accordance with this mission, the IGB POC Initiative is just one way that the IGB supports its faculty in pursuit of commercializable solutions to problems affecting humanity.

Although previous IGB POC funds have come from a variety of sources, the 2012 IGB POC

funding comes solely from the IGB. This year, three projects were chosen to receive POC funding as well as additional entrepreneurial support that will help bridge the gap between the laboratory and commercial applications. Thirteen proposals were reviewed by a panel of five experts from venture capital, industry, and academia. Funded projects were selected on the basis of having clear market potential, targeted milestones, secure intellectual property, and well-defined deliverables. The OTM facilitated the proposal selection process and will manage the distribution of monetary awards.

In addition to monetary support, the 2012 IGB POC award package includes many other services to help advance the commercialization of research projects including:

- 6 hours per month of free consultation with a Research Park Entrepreneur in Residence (EIR)
- Automatic acceptance into the highly competitive I-Start Entrepreneur Assistance Program and guaranteed 75%-90% upfront funding matching
- Assistance from OTM-appointed IGB Commercialization Analyst with market analysis, industry and venture capital activity reports,

and intellectual property landscape information

- Introductions to industry contacts, venture capitalists, and notification of entrepreneurial events

The funded proposals are:

"Evolutionary Pharmaceuticals" Dr. William Metcalf (IGB faculty, Department of Microbiology) and Dr. Neil Kelleher (Northwestern University, previous IGB affiliate): Drs. Metcalf and Kelleher propose to create a natural product screening platform based on Actinomycete genomes.

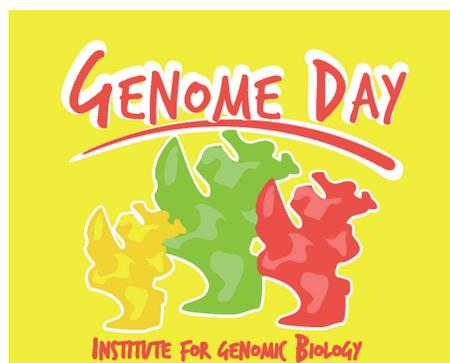
"Accurate Sequence Alignment using Distributed Filtering on GPU Clusters" Dr. Victor Jongeneel (IGB, NCSA) and Dr. Roy Campbell (Department of Computer Science): Drs. Jongeneel and Campbell's proposal seeks to decrease the time required to align short genomic sequence reads.

"Stereolithographically Assembled Living Vascular Stamp for Neovascularization of Wounds and Ischemic Tissue" Dr. Hyunjoon Kong (IGB faculty, Department of Chemical and Biological Engineering) and Dr. Rashid Bashir (IGB affiliate, Department of Electrical and Computer Engineering): Drs. Kong and Bashir are investigating a revascularization strategy to allow for spatial control of functional neovessels. ■

{Around the IGB}

Genome Day

Join us for Genome Day!



Saturday, November 3, 2012

Orpheum Children's Science Museum, 346 N. Neil Street, Champaign

Genome Day will be an opportunity to educate the community about genomes, genes, and DNA at the Orpheum Children's Science Museum in Champaign on Saturday, November 3, 2012. Although primarily for children of grade-school age, all members of the community will be welcome to attend this free event. Exhibits and activities will be designed to present the energy use and production, environment, health, and fundamental research at the IGB in an approachable manner for all ages.

Admission to the event and museum will be free. ■

Website

EBI launches redesigned site



As the Energy Biosciences Institute celebrates its 5th anniversary, it has redesigned and reorganized its web site in response to input provided by users over the past year. The site streamlines information delivery, improves navigation, and includes a comprehensive search function designed to assist visitors in accessing institute people and programs.

Experience what the new site has to offer at www.energybiosciencesinstitute.org. ■

HPCBio

iSGTW Feature

The High-Performance Biological Computing (HPCBio) group was recently featured on the iSGTW (International Science Grid This Week) website. The article "Keeping on top of the data deluge" highlights some of the challenges facing the biological research community and includes several quotes from HPCBio Director Victor Jongeneel.

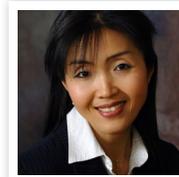
From istwg.org: According to Jongeneel, HPCBio goes beyond current high-performance comput-

ing centers and grid computing resources. "We're a full service facility. We offer a much wider range of services than a traditional high-performance facility. Users can even give us their raw data. With the high-performance computing environments offered by XSEDE, researchers have to have a certain level of competence in programming. With us they do not. We provide extensive domain knowledge in computational genomics and a full bioinformatics software stack."

Read the full article at <http://www.isgtw.org/feature/keeping-top-data-deluge> ■

Awards

University Scholars



Sua Myong received the National Institutes of Health Director's New Innovator Award for 2012, one of 81 researchers receiving awards to pursue visionary science. ■

Equipment

New Core Facilities Scope

Core Facilities will be receiving a new piece of equipment, the Zeiss Elyra Super Resolution Structured Illumination Microscope. Super resolution microscopy enables fluorescence imaging of structures too small for traditional methods, such as deconvolution and confocal microscopy. The new scope allows optical resolution to move from 250nm (confocal) to 120nm (SIM), and supports four laser lines of 405nm, 488nm, 561nm, and 647nm. Electron-multiplying CCD (EMCCD) technology grants exceptional detection sensitivity and allows for imaging of bleach-sensitive and live specimens. The EMCCD camera is also an ideal choice for recording SR-SIM data of entire cells. ■

Certificate in Entrepreneurship and Management (CEM)

New registration options

The Certificate in Entrepreneurship and Management (CEM) is a program for entrepreneurially minded MD students, DVM students, PhD students, and Post-Doctoral Associates in engineering, life sciences, and related disciplines who are interested in understanding the business, economic, and legal issues in scientific and high technical start-up ventures. Participants who have the scientific and high tech skills to do groundbreaking research will learn the business savvy needed to bring discoveries to market.

Previously available only as a full academic year program, students can now enroll only in the spring semester Kauffman FastTrac Tech Venture Course program. The Kauffman course runs from January-April, and completion of the program offers possible internships to further the experiential learning process.

The deadline for application is December 15, 2012. To learn more about the program or to complete the application, visit <http://www.igb.illinois.edu/cem/> ■

ADMINISTRATIVE NEWS

{Business}

2012 Campus Charitable Fund

The 2012 Campus Charitable Fund drive is underway. Please consider contributing! Take a moment to read the brochure by visiting the website at www.ccf.illinois.edu.

A few things you might want to remember:

We encourage everyone to give by on-line payroll deduction. If you are giving by payroll deduction, please remember to type in the annual amount you wish to donate. There is no limit to the number of agencies that you may select, but the minimum ANNUAL donation is \$24.00 (\$2 per month).

When making a one-time donation, make your check(s) payable to the umbrella organization(s) listed on the Pledge Form, not to designations within the umbrella.

If you have any questions throughout the campaign, please contact either Jacinda King at 244-2276 / jkking@illinois.edu or Dale Johnston at 244-5595 / dkjohnst@illinois.edu. The deadline is November 9, 2012. ■

{Communications}

Speaking to the Media

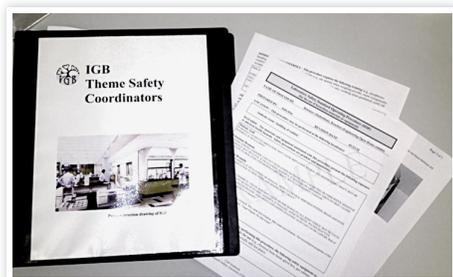


There is now available a short guide to assist you on interacting with the media, regarding interviews or news coverage. View the guide [here](#).

Sections include preparation tips, actions to take during the interview, and a list of important information to relate. Some of the key points to remember if speaking with the media are:

- Clearly convey your name, home department, and connection to the Institute for Genomic Biology (faculty member, affiliate).
- If you will be conducting research and it will take place at the IGB, make that statement.
- Adding your connection to the IGB in your author byline will greatly help track potential newsworthy publications and increase the possibility of coverage, so please do so! ■

Preparing Standard Operating Procedures for Laboratory Activities



One of the most important first steps in planning laboratory experiments is a comprehensive evaluation of the potential hazards associated with your work. This includes evaluation of hazards from chemicals, biological and radioac-

tive materials, equipment, physical hazards and conditions. A risk analysis of the planning process should be integrated into a single process evaluation. This evaluation should be documented and used as a tool for future reference in the form of a Standard Operating Procedure (SOP). In most cases, SOPs should be developed with the involvement of multiple researchers as opposed to individually.

What are the basic elements of an SOP?

When developing an SOP there is not a mandatory or required format to follow. The main purpose of an SOP is to ensure that safe work practices have been developed for any experimental work. The process ensures that safe work practices have been developed for your experiments and the SOP for that experiment can be integrated directly into your departmental laboratory safety manual.

SOPs should contain the following information:

Identification: Identify, specifically, the processes and procedures, individual hazardous materials or groups of hazardous materials, equipment and conditions or circumstances that would require special safety precautions.

Process Hazards Assessment: A hazards assessment which details potential hazards associated with the activity/process. This would include hazardous materials, physical hazards, equipment items electrical hazards, lasers etc.

Exposure Controls Review: The hazards assessment information should be utilized to consider potential exposures using the four “routes of exposure” as a foundation.

Engineering Controls: A detailed description of the engineering control requirements of the process/procedure along with a method of ensuring proper operation and efficacy.

Personal Protective Equipment: A detailed description of the Personal Protective Equipment requirements of the process/procedure along with the location of supporting reference information.

Storage and Handling Requirements: Detail storage requirements for hazardous materials and process handling issues specific to the procedure.

Training and Authorization: The training requirements for the specific procedure, or piece of equipment should be clearly defined, along with a mechanism to ensure proficiency within the laboratory. Specific procedures for access control and authorization during the procedure should also be outlined. All training **MUST** be documented and this documentation should be kept on file in your departmental safety manual.

Waste Management: Outline waste materials to be generated and appropriate waste disposal procedures for the work.

Decontamination Procedures: Specific methods for decontamination/cleaning appropriate to the work being completed should be included.

Emergency Procedures: Detail the specific procedures to be followed if emergency situations arise from the process/procedure. These steps will be based on the hazard assessment and controls sections.

The IGB Safety Coordinator and the campus Division of Research Safety (DRS) can assist in the development of laboratory specific SOPs.

An SOP template is available on the DRS website at [this link](#). ■

Data Plans for NSF and NIH Grants

At the October 16 IGB seminar, Sarah Williams and Sarah Shreeves from the University Library will talk about data plans for NSF and NIH Grants. As has been widely announced, NSF now requires a data management plan (DMP) to be submitted with each grant proposal, and for several years, NIH has required a data sharing plan to be submitted with a grant application over a certain amount. The seminar will begin with a brief overview of these requirements but will focus on practical information and resources for meeting these requirements. Data support and resources from the University Library will also be discussed.

The **DMPTool** (<https://dmp.cdlib.org/>) is one practical resource that will be highlighted. The DMPTool is an online wizard for creating data management plans, and it supports plans from a variety of funding agencies, including individual NSF directorates and NIH. The University of Illinois at Urbana-Champaign was one of the original contributing institutions that developed the DMPTool, and being a partner institution allows users from University of

Illinois at Urbana-Champaign to simply login with their NetID and password. In the future, the Library plans to include more institution-specific help within the DMPTool.

Databib (<http://databib.org/>) is another practical resource that is currently being beta-tested. Databib is a collaborative, annotated bibliography of research data repositories. Repository records include a URL, subject tags, a brief description, and information about how the existing data can be reused and whether new data can be deposited. It could be a helpful tool to learn about new repositories, or if you know of a repository that is not included, you can submit a record yourself. Anyone can submit or edit a record, and additions and changes are reviewed by an editorial board before they are accepted into Databib.

To learn more about these resources or to discuss other data issues, you can contact Sarah Williams at scwillms@illinois.edu. ■

{Recent Publications}

Li Z, Nair SK. Quorum sensing: How bacteria can coordinate activity and synchronize their response to external signals? *Protein Sci.* 2012;21(10):1403-1417.

Zelin E, Zhang Y, Toogun O, Zhong S, Freeman B. The p23 molecular chaperone and GCN5 acetylase jointly modulate protein-DNA dynamics and open chromatin status. *Mol Cell.* 2012.

Eichorst JP, Clegg RM, Wang Y. Red-shifted fluorescent proteins monitor enzymatic activity in live HT-1080 cells with fluorescence lifetime imaging microscopy (FLIM). *J Microsc.* 2012;248(1):77-89.

Hwang H, Buncher N, Opresko P, Myong S. POT1-TTP1 regulates telomeric overhang structural dynamics. *Structure.* 2012.

Gonnerman EA, Kelkhoff DO, McGregor LM, Harley BAC. The promotion of HL-1 cardiomyocyte beating using anisotropic collagen-GAG scaffolds. *Biomaterials.* 2012.

Panter MS, Jain A, Leonhardt RM, Ha T, Cresswell P. Dynamics of major histocompatibility complex class I association with the human peptide-loading complex. *J Biol Chem.* 2012;287(37):31172-31184.

Sun N, Abil Z, Zhao H. Recent advances in targeted genome engineering in mammalian systems. *Biotechnol J.* 2012;7(9):1074-1087.

Su X, Schmitz G, Zhang M, Mackie RI, Cann IKO, eds. Heterologous gene expression in filamentous fungi. ; 2012 *Advances in Applied Microbiology*; No. 81.

Liao X, Lu S, Zhuo Y, Winter C, Xu W, Wang Y. Visualization of src and FAK activity during the differentiation process from HMSCs to osteoblasts. *PLoS ONE.* 2012;7(8):e42709.

Olivas AD, Shogan BD, Valuckaite V, et al. Intestinal tissues induce an SNP mutation in *Pseudomonas aeruginosa* that enhances its virulence: Possible role in anastomotic leak. *PLoS ONE.* 2012;7(8).

Pedron S, Peinado C, Catalina F, Bosch P, Anseth KS, Abrusci C. Combinatorial approach for fabrication of coatings to control bacterial adhesion. *J Biomater Sci -Polym Ed.* 2012;23(12):1613-1628.

Miguez FE, Maughan M, Bollero GA, Long SP. Modeling spatial and dynamic variation in growth, yield, and yield stability of the bioenergy crops *miscanthus x giganteus* and *panicum virgatum* across the conterminous united states. *GCB Bioenergy.* 2012;4(5):509-520.

Dohleman FG, Heaton EA, Arundale RA, Long SP. Seasonal dynamics of above- and below-ground biomass and nitrogen partitioning in *miscanthus x giganteus* and *panicum virgatum* across three growing seasons. *GCB Bioenergy.* 2012;4(5):534-544.

Walters Jr. KR, Rupassara SI, Markelz RJC, Leakey ADB, Muir WM, Pittendrigh BR. Methamphetamine causes anorexia in *Drosophila melanogaster*, exhausting metabolic reserves and contributing to mortality. *J Toxicol Sci.* 2012;37(4):773-790.

Casteel CL, Niziolek OK, Leakey ADB, Berenbaum MR, DeLucia EH. Effects of elevated CO₂ and soil water content on phytohormone transcript induction in *Glycine max* after *Popillia japonica* feeding. *Arthropod-Plant Interact.* 2012;6(3):439-447.

Prasad KVSK, Song B-, Olson-Manning C, et al. A gain-of-function polymorphism controlling complex traits and fitness in nature. *Science.* 2012;337(6098):1081-1084.

Li Z, Chen J-, Hao Y, Nair SK. Structures of the PelD cyclic diguanylate effector involved in pellicle formation in *Pseudomonas aeruginosa* PAO1. *J Biol Chem.* 2012;287(36):30191-30204.



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