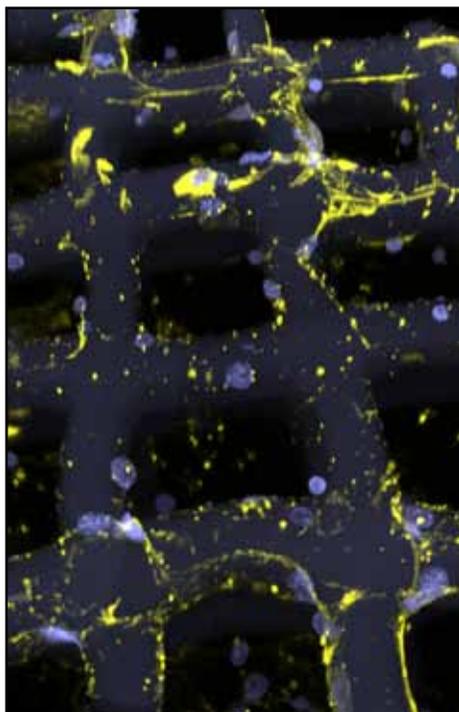




IGB NEWS

Achievements, awards, and information about the IGB community

IMAGE OF THE MONTH



This month's Core Facilities Image of the Month was made by Jennifer Shepherd. This image of "Cells Growing on Scaffold" was created with the Core Facilities' Zeiss LSM 710 confocal microscope.

UPCOMING EVENTS

OTM Coffee Break

1st floor breakroom, Main Lab Building | Jan 29, 2010 | 2:30 p.m. - 4:00 p.m.

Pioneers in Genomic Biology Lecture Series

Elaine R. Mardis

Washington University School of Medicine

IGB Conference Center #612 | Feb 2, 2010 | 12:00 p.m.

Pioneers in Genomic Biology Lecture Series

Eric D. Green

National Institutes of Health

IGB Conference Center #612 | Feb 16, 2010 | 12:00 p.m.

Chancellor's Colloquium on Evolution

"Illuminating the Microbial World: the Key to Understanding the Evolution and Ecology of the Living Earth System"

Ed DeLong

Massachusetts Institute of Technology

DCL 1320 | Feb 17, 2010 | 4:00 p.m.

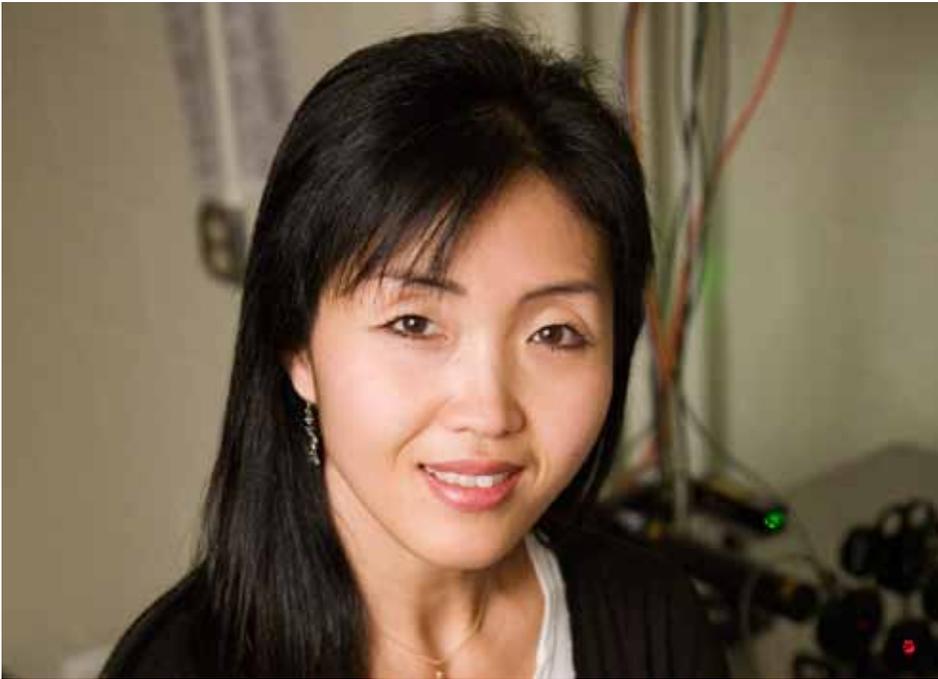
2010 Sylvia Stoesser Lecture

"Renewable Energy and Chemicals, UOP LLC"

Jennifer Holmgren

Vice President & General Manager

112 Chemistry Annex | Feb 24, 2010 | 4:00 p.m.



Single Molecule Imaging Reveals Surprising Activity

Sua Myong, a member of the Precision Proteomics theme at the IGB, is in the business of shifting paradigms, one molecule at a time. Myong, who is also a member of the bioengineering faculty, uses imaging techniques such as FRET (fluorescence resonance energy transfer) to help understand what is happening to single molecules during various cellular processes.

Looking at cellular processes at the single molecule level enables researchers to see very detailed behavior that would be lost if one were looking at large numbers of molecules at a time. In several cases her work has resulted in a new understanding of a given molecule, including a project involving Rep helicase protein.

“We wanted to visualize Rep movement from the 3’ end toward the 5’ end (of the single-stranded DNA),” says Myong. “We already knew that Rep cannot unwind DNA as a monomer, so we expected Rep to dissociate from the ssDNA when it encountered the double strand DNA region.”

But to her surprise, Myong’s imaging techniques demonstrated that when the Rep helicase arrived at the junction where the single strand DNA (already

unwound) meets the double strand DNA (dsDNA), the Rep molecule did not dissociate from the DNA but appeared instead to snap back to the 3’ end and take the same journey ... over and over and over again. In a series of elegant experiments using FRET, Myong demonstrated that, not only does the Rep helicase shuttle back and forth along the ssDNA, but it also is mediated by the 3’ end of the ssDNA, somehow looping back toward the junction, which enables the helicase to zip back to the 3’ end almost instantaneously.

Myong also determined how the shuttling movement took place. She demonstrated that ATP hydrolysis provided the fuel for the movement: when there was a high concentration of ATP, the shuttling movement was faster than when there was a low concentration.

Myong’s work suggests that Rep protein has an auxiliary role, beyond unwinding DNA, though it is not completely clear what that role might be inside of a cell. One theory, says Myong, is that by shuttling along the ssDNA, Rep is preventing other, random proteins from attaching to the fairly “sticky” ssDNA. Myong did find that in the presence of Rep, the formation of RecA filament,

which forms along the ssDNA during replication, is impeded.

These findings represent a paradigm shift in the understanding of Rep helicase and what its role is.

“It turns out that a single unit of Rep is a robust, repetitive translocase on ssDNA,” says Myong of her findings. “It’s likely that more units are needed to carry out the unwinding reaction.”

In addition, a similar type of repetitive shuttling activity also has been found in at least five other helicases in different contexts, suggesting a paradigm shift in our understanding of helicases in general, says Myong.

More recently, Myong has contributed to figuring out how the RIG I protein recognizes a viral intruder. Researchers have known that RIG I is the first alert system for viruses and that the system works because RIG I somehow recognizes either the triphosphate tag that viruses have, or the double-stranded RNA, which also is characteristic of viruses. However, researchers did not know how RIG I worked mechanistically. Nor did they understand the role of the ATPase domain within RIG I. ATP is a little fuel cell; why did RIG I need fuel?

Myong used a technique called “protein-induced fluorescent enhancement,” in which a fluorescent dye attached to a specific region of a molecule, glows with more or less intensity depending on how close it is to the protein that is interacting with that molecule. With that technique she and her colleagues discovered that RIG I moves—an activity that was not known before—and that it moves along the double-stranded RNA. In addition, the activity of RIG I along the RNA is greatly stimulated when the triphosphate tag on the 5’ end of the intruding virus is present.

RIG I translocation explains the presence of ATPase domain, and the increase in activity in the presence of both dsRNA and the triphosphate

tag suggests that RIG I relies on both pathogenic indicators to determine the presence of a virus, rather than just one or the other, says Myong.

“RIG I is double checking to really make sure it has both pathogenic signals, and that there really is a virus present,” she says.

Myong fell in love with bench work at the University of California, Berkeley, where she earned both her bachelor’s degree and her doctorate.

“I liked the bench work,” she says. “Running gels, cloning. I always worked

in a lab as an undergraduate.” Myong’s molecular and cellular biology bench work skills come in handy when she has to modify the protein she studies. For these experiments, a protein’s extraneous binding sites are “silenced” without affecting the function of the protein and then desired binding sites are engineered, again without impacting the protein’s function.

At the IGB, Myong helped build a single molecule fluorescence technique and fluorescence cell studies for the Precision Proteomics theme. The goal for the cell technique is to be able to image whole cells that have been

tagged with fluorescence in a critical region and then, with enough spatial resolution, image the cells at the single protein level.

All of Myong’s work up until now has been *in vitro* but she hopes to begin observing molecular processes *in vivo*. With these new tools and approaches, Myong stands to continue making surprising discoveries that will advance our understanding of a wide variety of cellular processes.

Awards

Humin Zhao & Donald Ort Named AAAS Fellows



Humin Zhao



Donald Ort

Huimin Zhao (Mining Microbial Genomes for Novel Antibiotics) and Donald Ort (Genomic Ecology of Global Change) have been awarded the distinction of AAAS Fellow by the American Association for the Advancement of Science. Zhao was cited “for pioneering directed evolution technologies for use in industrial biotechnology, gene therapy, and in producing renewable feedstocks.” Ort was selected for research accomplishments in the area of photosynthesis, ranging from molecular mechanisms to ecosystems scale responses, and for leadership through service in professional societies.

CALL FOR NOMINATIONS: The 2011 Bower Award and Prize for Achievement in Science

The Franklin Institute is currently accepting nominations for its 2011 Bower Award and Prize for Achievement in Science. The award will be presented to individuals who have made a significant contribution to the understanding of the structure and function of genomes. The award includes a gold medal and cash prize of \$250,000. Notice of intent to nominate is due by March 31, 2010,

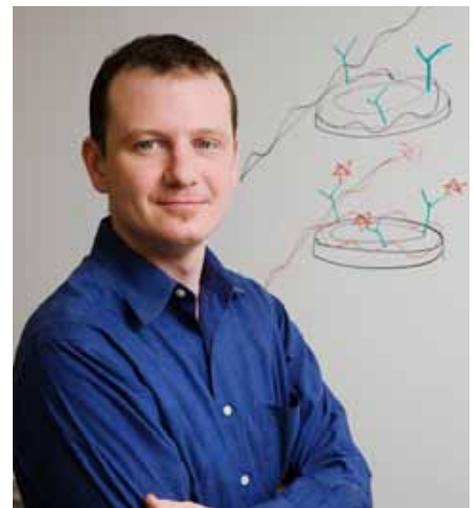
with complete nomination due May 31, 2010.

Since 1824, the Franklin Institute has inducted over 2,000 laureates, including Thomas Edison, Albert Einstein, Stephen Hawking, Noam Chomsky, and Jane Goodall.

Learn more about nominations:

www.fi.edu/franklinawards/call.htm

Ryan Bailey Chosen as One of “Tomorrow’s Pls”



Ryan Bailey (Precision Proteomics) has been chosen as one of “Tomorrow’s Pls” by *Genome Technology* magazine. Bailey’s lab is focused on improving personalized diagnostics by measuring gene and protein expression changes from very small amounts of sample. To that end, he’s created a new array technology that he’s called silicon-on-insulator microring optical resonator arrays, that “can combine the advantages of massively multiplexed detection and label-free operations,” he says.



ADMINISTRATIVE NEWS

News from the administrative departments that support the research mission of the IGB

BUSINESS



On January 5, 2010, President Ikenberry announced the implementation of a furlough program and other cash-conservation measures for the remaining months of the 2010 fiscal year. Refer to the FAQ section of the University administration web site for details:

<http://www.uillinois.edu/our/news/budget/2010FurloughFAQ.cfm>

COMMUNICATIONS



Become a fan of the IGB on Facebook! Check the daily lunch specials in the Array Café and be the first to learn about what's happening around the IGB. Search for "Institute for Genomic Biology."

COMPUTER AND NETWORK RESOURCE GROUP

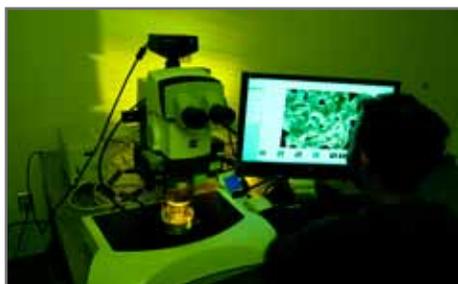


The Computer and Network Resource Group (CNRG) would like to announce the availability of our new BLAST service. Currently this service is free of charge to all IGB members and can be accessed by visiting the link below:

<http://cluster.igb.uiuc.edu/webblast/>

Work on this tool has just been completed, so feedback to help@igb.uiuc.edu is greatly appreciated. Early reviews have been very positive, providing results for 38,400 BLASTx searches versus the NR database in about two and a half hours.

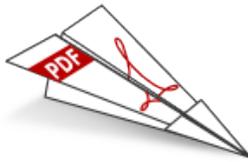
CORE FACILITIES



Optical Microscopy Class

Core Facilities is assisting Bob Clegg in offering an optical microscopy class this spring. The 3-credit class focusing on practical microscopy will consist of lectures on Monday and Friday mornings and lab exercises on Wednesday and Thursday afternoons. The class will start with sample preparation, followed with a look at instrumentation, widefield imaging, and confocal imaging, and will finish with more specialized techniques such as two photon imaging, second harmonic generation, fluorescence lifetime imaging, and super resolution techniques.

Research Resources: Tips for Making Your Life Easier



PAPERPLANE

If you use PubGet and Firefox as your preferred browser, be sure to install PubGet's PaperPlane. After searching PubMed in your usual fashion, you can click on the PaperPlane toolbar icon and be redirected to PubGet, where you can immediately start reading the full text of papers that match your PubMed search criteria! (Of course, you can also just use Pubget to search PubMed.) To get PaperPlane, just drag it to your Firefox bookmarks toolbar from this web site:

http://pubget.com/site/help/paper_plane



ENDNOTE ADDINS

If you're an EndNote user, you'll want to add the capacity to more readily view the full text of articles. Please visit the EndNote Support site for instructions on customizing your EndNote program:

<http://www.library.illinois.edu/biotech/endnotesupport.html>.

Follow the instructions for "Setting Up EndNote to Work with Discover."

After making the customizations:

If you are using EndNote 8 or higher, you'll be able to link out to the full text of the article. Just right-click on the citation in Endnote, and click on the link to "OpenURL." This feature is similar to what happens when you click on the "Discover" link in PubMed, Web of Science, etc. You will be redirected to the publisher's site for the full text of the article.

If you are using EndNote X3, you will, in addition, be able to download PDF files for the articles in your EndNote library for which the University Library holds subscriptions. The PDFs will be stored on your computer; links to the stored PDFs will be added automatically to the EndNote record for the article. You don't need to worry about naming the file, etc.

HANDY FREE WEB TOOLS

ZamZar (www.zamzar.com): Convert from PDF to Word documents. (Other file conversions also available.)



PrintWhatYouLike (www.printwhatyoulike.com) Tired of printing web pages only to find your printout is full of ads, empty space, and other junk you don't want? PrintWhatYouLike is a free online editor that lets you format any web page for printing in seconds. Great for editing out unwanted columns in web tables, too. Tip: Install the Bookmarklet so you can simply click on it when you get to a page you want to edit and print.



Awesome Highlighter (www.awesomehighlighter.com) Lets you highlight text on a page and creates a URL for the page with your highlight, which you can share with others. E.g., here's my homepage, with a few highlights: <http://awurl.com/SLqxbHNe>. Tip: Add the Firefox Add-on so you can just click on the link when you land on a page that you want to highlight.



TinyURL (www.tinyurl.com) Converts long URLs to tiny URLs—great for sending URLs in emails or for posting URLs to web sites!



Making long URLs usable! More than 400 million of them. Over 2 billion hits/month.

OPERATIONS AND FACILITIES



Battery Recycling

Rechargeable Batteries

There are three Call2Recycle collection areas on campus: Physical Plant Service Building, Stores and Receiving, and the College of Veterinary Medicine. The Call2Recycle program is free and will accept rechargeable batteries that contain Nickel/Cadmium, Nickel Metal Hydride, Lithium Ion and Small Sealed Lead batteries less than 2 lbs. If the University does not recycle rechargeable batteries, they are considered hazardous waste and must be disposed of through the University Division of Research Safety (DRS).

Alkaline Batteries

The Students for Environmental Concerns (SECS) has initiated an alkaline battery and ink jet recycling program at the Illini Union. Alkaline battery disposal is not currently regulated by the IEPA. However, if you would like to recycle them, there are two collection bins in the Illini Union. One bin is located near the south entrance and the other in the east vending room.

SAFETY



Watch your step in the snow!

The pavers around the IGB plaza can become slippery, so proceed with caution.

POST DOCS AND GRADUATE STUDENTS: ATTEND BIO 2010 IN CHICAGO



Bio 2010, the largest global event for the biotechnology industry will be held Monday, May 3, through Thursday, May 6, in Chicago. Featured speakers will include former Presidents Bill Clinton and George W. Bush. In addition, Al Gore will give a keynote address on climate change. More information about the Bio 2010 program can be found at <http://convention.bio.org>.

The IGB is willing to cover the costs for two IGB postdoctoral associates or graduate students to attend this

meeting. Specifically, the IGB will cover full registration, hotel costs for Monday and Tuesday nights, and provide a per diem for meals on Monday, Tuesday and Wednesday. The attendee will be responsible for their own transportation costs.

If you are a graduate student or postdoctoral research associate working in the IGB and are interested in attending this meeting, please submit an email to the Associate Director Jennifer Quirk at quirk@uiuc.edu by no later than February 15 describing why you want to attend the meeting and specifically how attendance at the meeting will benefit you professionally.

Winners will be announced no later than March 1, 2010. If you have any questions, feel free to contact Jennifer directly.

IP @ IGB

New Hours for the Spring Semester

Nicole Janovick from the Office of Technology Management holds office hours at the IGB in Room 2606 (Gatehouse): Mondays from 9:00 a.m. - 1:00 p.m., Tuesdays from 9:00 a.m. - 12:00 p.m., and Wednesdays from 9:00 a.m. - 12:00 p.m. During this time she is available to answer questions about intellectual property and technology transfer.

Questions: janovick@illinois.edu

2009 IGB Holiday Party



IGB Faculty, staff, and students celebrated the holiday season on December 3, 2009

New Occupational Safety Coordinator Getting up to Speed (Safely!)



The IGB's new Occupational Safety Coordinator was the ideal candidate to tackle the diverse research portfolio at the IGB—perhaps because he has a pretty diverse background of his own.

Robert Mann, who joined the IGB in December 2009, grew up on a farm right here in east central Illinois, so he knows a thing or two about the challenges of agricultural safety. But he also spent six years working as a

safety officer at a local hospital, which means he's as comfortable in the lab as he is on the farm. Mann will oversee safety programs for the nine research themes in the IGB, as well as the EBI and the EBI's Energy Farm.

Mann has been spending most of his time "getting up to speed" on current safety protocols at the IGB, meeting with faculty and staff and getting to know the IGB facility inside and out. His primary focus is to make the safety program the best of its kind on the Illinois campus. It's an ambitious goal.

"One of the biggest challenges I have is to continue with the implementation of the laboratory chemical hygiene plans," he said, "especially the development of the chemical inventories that are required for the chemical hygiene plan." This enormous undertaking is required under 29 CFR 1910.1450, OSHA's "Occupational

exposure to hazardous chemicals in laboratories" standard.

Mann has a Bachelor of Science in Occupational Safety and Environmental Health from Illinois State University. Before joining the IGB, Mann spent three years as the Safety Coordinator for campus Facilities and Services, working with the maintenance and construction shops. Prior to joining the University, Mann spent six years as the Safety Officer for Carle Foundation Hospital and Carle Clinic Association in Urbana, IL.

For more information about the safety program at the IGB, see <http://www.igb.illinois.edu/training/index.php>.

Building Art Work



2010: Laboratory Atrium third floor



2008: "Darwin's Playground"



2009: "Untitled Project: Science Fictions"

On January 11, installation of another piece of IGB artwork began on the Laboratory Atrium third floor. There will be three parts to the project and installation will continue through the spring semester. The piece joins "Darwin's Playground" (on the plaza) and "Untitled Project: Science Fictions" (on the second floor).

IGB artwork was funded by the Illinois Capital Development Board's Art-in-Architecture Program, as part of the original construction project.



Green Ideas at IGB



Can you work without your lights on? Do you really need to hit "print"? Do you remember to shut off your computer monitor when you are away from your desk? Remember, small changes add up to big savings!

Have an idea to make the IGB "greener"? Send it to: greenideas@igb.illinois.edu

Thermostats



To adjust your thermostat, hit "display," then adjust the controls up or down as desired, then hit "enter." Remember, maximum temperatures are set by campus policy.

Array Café



Array Café has resumed regular hours: Monday - Friday from 8:00 a.m. - 3:00 p.m. And remember, you can always get the daily specials on the IGB Facebook page, so become a fan today!

IGB News is published every month by the IGB Communications Office.

Contact: Melissa Edwards
mme@illinois.edu, 217.333.0873

www.igb.illinois.edu