FAREWELL SUGA LAB, You Will be Missed!

On August 20th, 2010, Biology Department Faculty and Staff gathered to say farewell to Nobuo Suga and his research team: Xiaofeng Ma, Weiqing Ji, Weiguo Yang and Sally Miller. Dr. Suga has been with Washington University since 1969. A legend in his own time, Suga is internationally famous for research on the auditory systems of bats.

National Academy of Sciences Description of Nobuo Suga and His Research—Dr. Suga has led discoveries in the neurophysiology of hearing through research on bat echolocation. Elected a Fellow of the National Academy of Sciences in 1998, Nobuo Suga, Ph.D., professor of biology at Washington University, has been honored for his ground-breaking work in bat hearing that has major implications for people suffering from stroke or brain damage.

For three decades Dr. Suga and his colleagues have studied the auditory system of bats, which is highly developed to guide the night-flying mammals. Their

—cont’d on page 2
**Suga Lab cont’d**— investigations have targeted the complex neural mechanisms used in echo-location: bats send out sound signals then interpret the reverberating echoes to navigate, locate food and communicate among themselves. Dr. Suga has applied the analysis of the bats’ central auditory systems to understand the process in other mammals, including humans. He showed, among other things, the similarity between the bat’s auditory system and the mammalian visual system.

His recent studies have broken new ground to show that the auditory system of the brain can adapt in response to stimuli and associative learning, termed plasticity. The Suga team has found that in bats, auditory information moves from the inner ear to the cerebral cortex at the top of the brain. Feedback loops are formed as signals come down from the cerebral cortex to the inner ear. Dr. Suga has opened new avenues regarding the mechanisms by which sounds are encoded by specific cells in specific brain areas. More recently, his lab has shown that sensory stimulation causes feedback from the cortex to the lower brain structures. — [http://academyofsciencesstl.org/initiatives/fellows/s/nubuo_suga.php](http://academyofsciencesstl.org/initiatives/fellows/s/nubuo_suga.php)

**JEZ LAB**

1) Ashley Galant, a Plant Biology graduate student in the Jez Lab, was named as a Spencer T. and Ann W. Olin Fellow in Biomedical Sciences. For her thesis, Ashley is studying how environmental and cellular changes alter protein function in plants. This project began with her crystallographic studies on the three-dimensional structure of homo-glutathione synthetase, an enzyme required for the synthesis of a critical redox buffer in soybean. More recently, she has used a redox-proteomics to examine how environmental pollution (i.e., ozone) effects proteins in soybean. Understanding how soybean remodels its redox-sensitive pathways in response to elevated ozone levels, which reduce seed yield, will provide information about how to target the engineering of ozone protection systems in this economically important crop.

2) Sheri Balogun, an undergrad, received an NIH MARC-uSTAR scholarship.

3) Soongoo Lee, a Plant Biology grad student, received a travel award to attend the April ASBMB Experimental Biology 2011 meeting in Washington, DC.

4) Geoff Ravilious, a Computation and Molecular Biophysics grad student, will be presenting a talk in the "Kinas-es, Phosphatases, and Phosphorus in Biological Reactions" section at the April ASBMB Experimental Biology 2011 meeting in Washington, DC. —Joe Jez
HASWELL LAB

The Haswell Lab is using both forward and reverse genetic approaches in Arabidopsis to study how plants respond to mechanical stimuli.

Forward genetics: Screen for thigmomorphogenesis mutants

Haswell Lab is interested in finding genes involved in thigmomorphogenesis, a developmental response to mechanical stimuli. When most plants are continuously stimulated they don’t grow as tall and wide, but are generally shorter and thicker. To identify the master regulators of this process, Greg Jensen (past Research Technician) executed a forward genetic screen for plants that are defective in thigmomorphogenesis. This research, which was funded by Monsanto, may have real life application if it can help farmers learn to control how tall and thick their crops get. One gene identified in the screen, “THICKSKINNED1,” may help plants remember how much they’ve been touched, by controlling epigenetic modifications at key target genes.

Reverse genetics: The MSL gene family

The Lab is also studying a recently discovered class of ion channels called MscS-Like, or MSL proteins. MSL proteins may be responsible for plants sensing mechanical stimuli, but very little is known about these proteins and how they function. To gain a greater understanding of how and why the MSL proteins function, postdoc Grigory Maksaev has been pioneering the use of electrophysiology in the Haswell lab. Grigory joined the lab in February 2010. His research attempts to answer whether MSL proteins are indeed mechanosensitive ion channels. Grigory uses the patch-clamp technique to isolate a small “patch” of membrane containing one to several ion channels and assays ion flux across the membrane in response to different stimuli. He has been studying MSLs from E. coli and from Arabidopsis, expressed in Xenopus oocytes or in giant E. coli spheroplasts.

There are 10 MSL proteins in Arabidopsis, but much of the lab’s work has focused on two of these channels, MSL2 and MSL3. Plants that lack MSL2 and MSL3 have patchy leaves, stunted growth, and very big chloroplasts.

Silvano Ciani and Maggie Wilson, two graduate students in Wash U’s Plant Biology Program, are studying MSL2 and MSL3 in order to understand their properties and functions. Silvano Ciani has been with the Haswell Lab since September 2008, and has been — cont’d on page 4
addressing a unique feature of MSL2 and MSL3—their localization to the poles of chloroplasts. He looks at chloroplasts using confocal microscopy, to learn how and why these mechanosensitive ion channels are located at the poles. Maggie Wilson, part of Haswell Lab since September 2009, has recently shown that MSL2 and MSL3 interact with the plastid division machinery, suggesting that plants lacking MSL2 and MSL3 have large chloroplasts because the plastid division process has been disrupted.

Postdoc Kira Veley, with Haswell Lab since April 2010, studies MSL9 and MSL10, two of the 10 MSL proteins that are localized to the plasma membrane instead of organelles. Kira has been taking several approaches to identifying the function of MSL9 and MSL10, including the expression of phosphorylation mutants and analysis of MSL9/10-interacting proteins. Kira injects tobacco plants with DNA encoding MSL9, MSL10, and candidate interactors to assay for protein-protein interactions.

Undergraduate Michael Benefiel has been with the Lab since his freshman year in September 2008. He keeps the Lab stocked with solutions and instruments and also assists Liz with MSL2 and MSL3 studies, phenotyping and genotyping the plants they raise in the chambers. Undergraduate Andrew Katims is trying to find new mutant alleles of MSL3 under the supervision of Silvano.

Undergraduate student, Michael Benefiel, assists Liz Haswell with phenotyping and genotyping these plants, raised in growth chambers

Confocal Microscope in the Haswell Lab
TEMPLETON LAB

Templeton Lab has a tradition of taking a Fall and Spring Hike. We took our Fall hike on Sunday, Oct. 31. Because it was Halloween, we hiked to Wildcat Mountain in Taum Sauk Mountain State Park. One of the geological formations on Wildcat is an old pre-Cambrian volcanic dyke called the “Devil’s Wall”. Another nearby formation is the “Devil’s Toll Gate.” We finished our Halloween Hike with a stop at Ted Drewe’s to enjoy Great Pumpkin concretes.

Group on Devil’s Wall (l to r): Arthur Porto, Loren Sackett, Nic Kooyers (a grad student from Ken Olsen’s lab), Carlo Lapid, and Amy Conley

Group at Mina Sauk Falls (l to r): Nic Kooyers, Arthur Porto, Carlo Lapid, Amy Conley, Loren Sackett

Spring Field Work—by Alan Templeton

I am in Israel from mid-January until early March. My main project here this time concerns the conservation biology of the endangered salamander, *Salamandra inframaculata*, that lives on mountain tops in Northern Israel. Last December, Israel experienced the largest fire in its history, which was reported even on the national news in the USA. This fire burned large areas of Mt. Carmel and included most of our Carmel salamander sites. Our genetic surveys have revealed that the Carmel salamanders are genetically distinct from the ones living in the Galilee, so we were concerned about the fate of this genetically unique population. We are still in the process of surveying our sites, but we have some initial observations. —cont’d on page 6
TEMPLETON LAB cont’d

As with the large landscape fires that my lab studies in the Ozarks, this large forest fire had very heterogeneous effects on the ground, creating a mosaic of areas ranging from those that did not burn at all to other areas that were burned to a crisp. Salamander sites that were in areas that were not burned had many larvae in the temporary ponds that form here during the rainy season (which is the winter and why this work must be done at this time of the year). These populations seem to have been minimally effected, if at all. In areas that did burn, the fire greatly reduced the population. For example, one site where we would normally find hundreds of larvae without much effort yielded only one larva after considerable searching. A complete assessment still needs to be performed, but we do know already that the Carmel population has not gone extinct, but it has been reduced. We still need to assess the adult population, which spends more time in the forest proper and hence may have been impacted more severely.

I also attended and spoke at the ILINAT meetings in Eilat, a city on the Red Sea on the southernmost tip of Israel. The ILINAT meetings are held every three years and are the largest scientific meetings for biologists in Israel, with an attendance of over 2,500. International speakers are also invited, with the keynote given by Eric Lander from MIT. The international presence means that the official language of the meetings is English, which is fortunate for me as my Hebrew is rather poor. Here are some pictures from my field work on Mt. Carmel.

Shalom from Israel,
Alan

Above: Bonnie Templeton and Israeli colleague, Leon Blaustein, at a salamander site that burned. Bottom Left: Lone larva found at this site. Bottom Right: This picture shows the burned forest, the primary habitat of the adult salamanders.

Above: Leon Blaustein collects salamanders at one of the sites that was spared burning (the Warburg site) and that had many larvae.
UPCOMING WORKSHOPS

Introduction to Genomic Medicine

Genomics play a role in 21st century research and clinical practice and Washington University School of Medicine is at the forefront of this evolving field. To continue to meet this challenge, a new cadre of investigators will need comprehensive training in topics related to genomic medicine.

A new seminar series is scheduled for this spring which offers a practical background in molecular biology and genetics, an introduction to genomic research and applications of genomic technologies in the research environment, and an understanding of the clinical application of gained knowledge. The content will be delivered by Washington University faculty and there will be plenty of opportunities for questions and discussion. Make sure to arrive early and get a good seat!

WHEN: Monday afternoons, 4:00-6:00p.m., January 31 - June 20, 2011

WHERE: Wohl Auditorium

WHO CAN ATTEND?
This lecture series is designed for clinicians and other interested persons, including basic science researchers, fellows, post doctoral scholars, and anyone else who wishes to learn more about these topics.

HOW CAN I LEARN MORE?
Email holmeskr@wustl.edu or visit www.becker.wustl.edu/GenomicMedicine to view the schedule and sign up for the mailing list.

This seminar series is a collaboration between the Department of Medicine, the Department of Genetics, the Department of Pediatrics and Becker Medical Library and is sponsored by the Washington University Institute of Clinical and Translational Sciences.

—Seth Crosby

RECENT PUBLICATIONS

Case Studies for Understanding the Human Body

The second edition of Stan Braude's Case Studies for Understanding the Human Body has just come out from Jones Bartlett Press. This new edition has kept the best fictional mysteries from the first edition with a whole new set of cases from popular culture. These include Ted Kennedy's tragic brain tumor, Nancy Pelosi's botox injections, Jacky Robinson's diabetes, alcohol metabolism in Animal House, the Elephant Man's blocked lymphatics, Jimi Hendrix's drowning and Karen Carpenter's anorexia, the sacrifice of the beating heart in Indiana Jones and the Temple of Doom, the consequences of Mrs. Robinson's seductive cigarette smoking, Sheriff Cane's fast reflexes in High Noon, Benjamin Franklin's bifocals, and many more. Forced to stop at 45 chapters, he has saved Camille's consumption, Gogol's Nose, Hardy's Milkmaid, Proust's madellines, Poe's heart and dozens of others for the forthcoming, Literary Companion to the Human Body.

—Stan Braude

Freshmen Phage Hunters get published in Scientific Journal

In the fall semester of 2008, the Biology department at Washington University began offering a new freshman focus course, Phage Hunters. The course was designed and is supported by the Science Education Alliance at the Howard Hughes Medical Institute. The course offers freshmen an authentic research experience. Starting in the fall semester, students collect soil samples, and isolate mycobacteriophage (viruses that infect bacteria) from the soil. Nearly all the phages isolated in this way are novel, meaning the students are finding something new that has never been studied before. Over winter break the DNA genomes of several phages are sequenced, and in the spring semester students analyze the sequence information to get an in-depth picture of how their phage works, and how their phage relates genetically to other previously characterized phages. Recently a research paper titled “Expanding the diversity of mycobacteriophages: Insights into genome architecture and evolution” was published in the PLoS ONE journal, and included 12 Washington University undergraduates from the 2008 Phage Hunters class as authors!

—Kathy Hafer
I have had a number of requests to learn more about our new facility. The facility is called the Genome Technology Access Center (GTAC – and believe it or not, we actually were not trying to come up with yet another ACGT combo). Please see our site <http://gtac.wustl.edu/> for more information, but here is the skinny:

**Sequencing**

* Illumina HiSeq2000 – ~15Gb/lane  
* 96 indexes, multiple samples per lane  
* Library construction service  
* ICTS-Just In Time Funding available  
* Free sequence analysis  
* 3-4 week turn-around (expedited service available)  
* Low sequencing prices

**Microarray** – we continue to offer comprehensive microarray services

* All microarray formats (also low price, but subject to project size)  
  * Scanners (iScan, Agilent G2565CA, Affy, GenePix 4000B)

**qPCR etc**

* Life Tech 7900  
* Life Tech OpenArray  
* Luminex

Please feel free to write me with any questions.

For those who are wanting to characterize that difficult mid-range number of genes (3-36) in dozens/hundreds of samples, we now offer QuantiGene Plex. Affymetrix produces this. They will be around at a trade show at Eric P. Newman Education Center tomorrow (Thurs) from 10-2 to go into great and agonizing detail on this technology.

The technology allows for multiplex analysis of gene expression (mRNA) as well as genomic DNA copy number variation (CNV). The assays can work directly from cells, tissues, blood, and FFPE samples – without the need for nucleic acid purification. Only a lysis step is necessary to prepare samples. Of course purified genetic material works as well.

This is how it works: the target is captured in a sequence-specific manner on a bead, and an enzyme-free system creates a signal with a series of 12 sequence-specific probes that cover between 400-500 nucleotides. No enzymes. The beads are read in a Luminex system.

The limit of detection is 1500 copies of target mRNA, or 10,000 copies of genomic DNA. Suggested starting material is 5,000 cells, or about 100ng total RNA for studies done in triplicate. If necessary, less material can be used and samples can be run in duplicate, which may result in some loss in sensitivity of statistical significance, respectively. This product is not appropriate for single cell analysis. Our bead plexes are QC validated and shipped within two weeks of order.

The assay can multiplex 3-36 targets for mRNA, 3-34 targets for gDNA CNV. Please contact Chris Sawyer at csawyer@genome.wustl.edu 314-286-1452 for scheduling and pricing for assay services and/or Luminex reads.

—Seth Crosby, scrosby@genome.wustl.edu

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**NEWS FROM THE GENOME TECHNOLOGY ACCESS CENTER (GTAC)**

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Don’t miss the annual Viktor Hamburger Lecture  
Thursday March 24th, 2011, 4:00-5:00pm, Rebstock 215  

Pasko Rakich - Yale University  
“Making Maps of the Mind: Molecular Mechanisms of Neuronal Migration”
FACULTY AND STAFF HONORS AND AWARDS

OLSEN AND JEZ NOW ASSOCIATE PROFESSORS

Biology faculty members Ken Olsen and Joe Jez have been promoted to Associate Professors with tenure. Congratulations to both of you!

GRANT AWARDS

Ben-Shahar, Yehuda:

“Posttranscriptional Mrna Dependent Regulation Of Neuronal Excitability,” 7/1/10-6/30/13, Klingenstein Fund—$150,000

“The Role Of Divalent Metal Cation Homeostasis In Obesity,” 2/1/11-1/31/12, Children’s Discovery Institute continuation—$100,000


Kunkel, Barbara: “Collaborative Research: Modulation Of Host Auxin Physiology By Pseudomonas Syringae,” 8/1/10-7/31/13, NSF—$371,273

Schaal, Barbara: “Graduate Assistance in Areas of National Need,” 7/1/10-6/30/13, Department of Education—$656,325

Waselkov, Katherine: “An Investigation Of The Phylogeographic Origin And Conservation Status Of Endemic Ama ranthus Species,” 4/1/11-3/31/13, National Geographic Society—$8,780

TYSON LIVING LEARNING CENTER OFFICIANLY RECOGNIZED AS A “LIVING BUILDING”

Eden Brukman, vice president of the International Living Building Institute, presented Chancellor Mark S. Wrighton with an award recognizing Washington University in St. Louis’ Living Learning Center as a Living Building. The Living Learning Center (above, photo by Jerry Naunheim, Jr.), located at the Tyson Research Center in west St. Louis County, was one of only two buildings to meet the institute’s Living Building Challenge in 2010. The challenge is widely recognized as the world’s most rigorous green building performance standard. To achieve certification, a project must generate all of its own energy through clean, renewable resources; capture and treat its own water through ecologically sound techniques; incorporate only nontoxic, appropriately sourced materials; and operate efficiently and for maximum beauty. All program requirements must be met for a full year of operation and proven through a third-party audit. From The Record: http://news.wustl.edu/news/Pages/21915.aspx.

To view a video of the award ceremony at the Living Learner Center, visit: videonews.wustl.edu/?play=Living_building_award_21511.
Welcome to “safety spotlight”. Thankfully, we have no recent chemical spills or laboratory fires to write about. However, there have been three separate injury accidents that all did require medical treatment:

1 * A few months ago, one of our labs experienced a multiple cut hand and forearm injury when one of its workers tried to move a broken glass receptacle. Upon grasping the container, as a result of overfilling, sharp pieces of glass started to poke through the top and sides of the inner plastic lining and the outer singly corrugated fiberboard wall, thereby breaking the victim’s skin in several places. This incident illustrates how important it is, as a general rule, to limit the filling of any container, be it with hazardous or regulated medical waste, chemicals, or, as in this case, with sharp pieces of glass, to a maximum of up to 80% of its volume. Avoiding filling above this amount will also ensure that other container capacities, such as closure design, are not challenged.

2 * More recently, someone in another lab area had to be taken to the hospital due to a burn caused by a diluted acid solution. Apparently, one contributor to this unintended contact was the acid container’s too close proximity to the counter’s edge. When it was knocked over, the solution splashed on the worker’s abdomen and penetrated one layer of clothing, resulting in a minor burn. At the time of the incident the victim was wearing no personal protective equipment (P.P.E.) and is, therefore, fortunate that no serious bodily damage occurred. Even the minor injury that was sustained could have been significantly moderated if a lab coat would have provided the primary barrier to the liquid, in addition to the shirt the subject was wearing. Please remember to use your P.P.E., especially closed-toed shoes, whenever you are working with hazardous chemicals, including diluted acid solutions, such as in this case.

3 * The very latest injury accident took place in one of our common areas where liquid nitrogen can be dispensed at the end of the transfer hose from the Dewar caused the cryogenic nitrogen to flow at an irregular and fast enough rate to splash for a few seconds on the user’s right hand who was wearing thermally protective gloves on both hands at the time, thus limiting the skin burns and blisters to minimum damage on three fingers. It is currently unknown who took the phase separator; it was replaced with a new unit immediately following the report of this injury. Because liquid nitrogen is so cold (circa minus 330 degrees Fahrenheit) and typically highly pressurized during Dewar transfers, let this incident remind you to always wear goggles or safety glasses with side shields in addition to other P.P.E., such as thermal gloves and possibly a face shield to cover any exposed skin whenever working with LN2.

Continue to be safe – and remember: “Falling objects can be brutal if you don’t protect your noodle”.

Do you have any exciting news to share? Please submit announcements, lab notes and photos to Erin Gerrity: gerrity@biology2.wustl.edu