

IGB NEWS

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Research News
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Volume 11 Number 3

UPCOMING EVENTS

IGB Seminar (GNDP)

Using Whole Genomes to Resolve the Avian Tree of Life, Complex Behavioral Traits, and Genome Evolution
April 17, 2018, 12:00 p.m.
612 Carl R. Woese Institute for Genomic Biology

Erich D. Jarvis, PhD
The Rockefeller University
Molecular Neurobiology & Animal Behavior

Lunch with the Core

College & Curriculum Update: Carle Illinois College of Medicine
April 18, 2018, 12:00 p.m.
612 Carl R. Woese Institute for Genomic Biology

Judith Rowen, Associate Dean, Academic Affairs

IGB Seminar

Antibodies, Antigens and Enzymes: Creating the Building Blocks of In Vitro Diagnostic Assays
April 19, 2018, 12:00 p.m.
612 Carl R. Woese Institute for Genomic Biology

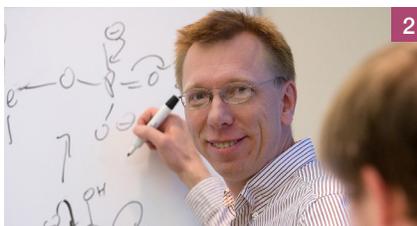
A. Scott Muerhoff, PhD
Director of Biologics and Senior Research Fellow
Abbott Diagnostics

IGB Fellows Symposium

May 3, 2018, 12:00 p.m.
612 Carl R. Woese Institute for Genomic Biology
<https://fellows.igb.illinois.edu/>

Plenary talks and keynotes from Claire Fraser, Director of the Institute for Genome Sciences at the University of Maryland School of Medicine, and Benjamin Garcia, Presidential Professor of Biochemistry and Biophysics at the Perelman School of Medicine, University of Pennsylvania. Submit to our open poster session, prizes for top three choices. Lunch is provided, registration is free.

FEATURED NEWS



2

Million-plus new compounds, pharmaceutical potential



3

Research aims to improve prostate cancer outcomes



4

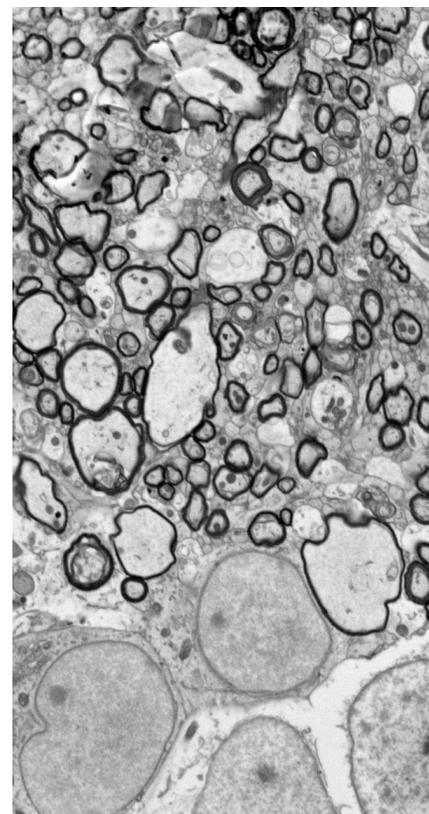
Monthly Profile: Stephen Moose



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On the Grid: Happenings at IGB

IMAGE OF THE MONTH



This month features a section of piglet corpus callosum processed using serial block-face scanning electron microscopy. Myelinated axons are depicted by the dark circular rings. This image was taken using the Zeiss Sigma BP 3View SBF-SEM, provided by Stephen Fleming and Dr. Ryan Dilger of the Dilger Lab, the Piglet Nutrition and Cognition Lab, the Animal Sciences Department, and Kingsley Boateng of Core Facilities.

IGB News

Share your news with the IGB. Send ideas on stories, articles, and features to nvasi@illinois.edu.



Study yields million-plus new compounds, pharmaceutical potential

Researchers say they can now produce a vast library of unique cyclic compounds, some with the capacity to interrupt specific protein-protein interactions that play a role in disease. The new compounds have cyclic structures that give them stability and enhance their ability to bind to their targets.

The study, reported in the journal *Nature Chemical Biology*, also revealed that one of the newly generated compounds interferes with the binding of an HIV protein to a human protein, an interaction vital to the virus's life cycle.

Most drug-discovery efforts focus on disease-inducing interactions in enzymes and proteins that involve classic "lock-and-key" mechanisms, said University of Illinois chemistry professor and member of the Mining Microbial Genomes research theme Wilfred van der Donk, a Howard Hughes Medical Institute Investigator who co-led the study with University of Southampton chemical biology professor Ali Tavassoli. "In most cases, small chemical drugs bind to cavities in enzymes, where the chemical reactions take place. By binding to these crevices, the drugs prevent the enzymes from working."

However, many disease processes involve protein-protein interactions that do not fit this model, van der Donk said.

"These have long been considered challenging because they do not involve such cavities. These protein-protein interactions often are made up of extended surfaces that can be difficult to inhibit with small molecules," he said.

Linear peptides also are problematic. They can be "floppy, like spaghetti, and therefore most of the time are in incorrect orientations to bind," van der Donk said. Cyclic molecules composed of one or

*Chemistry professor
Wilfred van der Donk, above,
and his colleagues developed
a new method for generating
large libraries of unique
cyclic compounds.*

more rings of amino acids are more stable and less susceptible to cellular enzymes that tend to chew off the ends of linear peptides. They are thus more likely to successfully bind to their targets.

In the new study, van der Donk and his colleagues made use of an enzyme they discovered from a bacterium that lives in the ocean.

"This enzyme's natural role is to make about 30 different cyclic proteins, and we tested whether it could make analogs of these natural products in *Escherichia coli*," van der Donk said. *E. coli* has been used as a drug-producing factory for pharmaceutical products.

The genetic sequences inserted into *E. coli* all coded for a series of amino acids recognized by the en-

zyme. By randomly adding specific amino acids to this "leader sequence," the team was able to generate a library of more than a million unique multicyclic proteins.

Tavassoli and his colleagues next screened this library in genetically engineered *E. coli* for proteins that could interrupt the binding of the HIV protein to its human host cell target.

"We engineered the genes of the *E. coli* strain such that its survival depended on disrupting the interaction between the human protein and an HIV protein," Tavassoli said. His team found three potential therapeutic agents. Further testing revealed that one of the three worked best. In a test tube and in cells, the compound bound to the human protein, stopping the HIV protein from interacting with it.

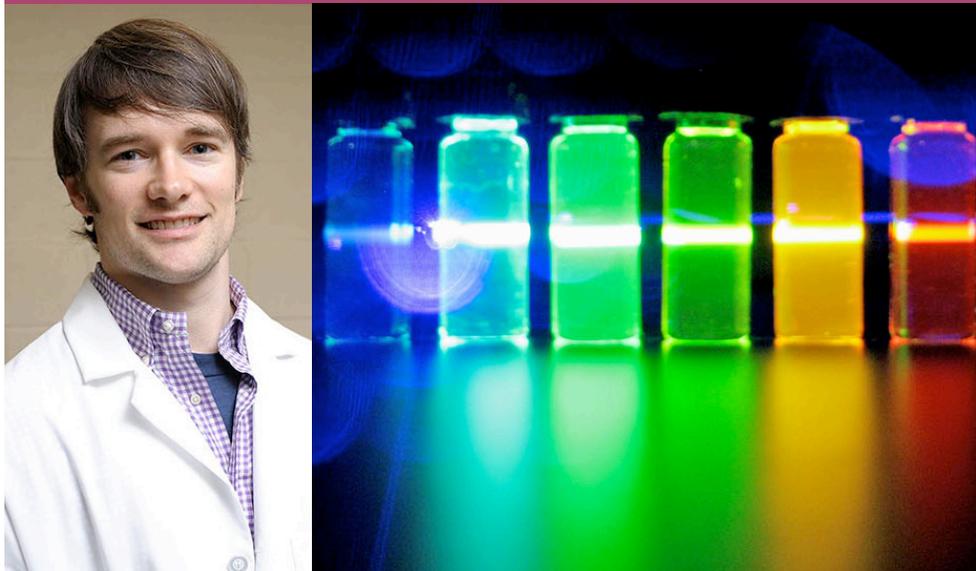
This drug agent likely will not be used therapeutically, however, as it may have toxic side effects at high doses as a result of its interaction with the human protein, the researchers said.

"The real advance here is the ability to generate libraries of millions of potentially therapeutic agents," Tavassoli said. "These could be screened to identify inhibitors of other disease-related processes, which is where its real potential lies."

The National Institutes of Health, the Howard Hughes Medical Institute and the United Kingdom Engineering and Physical Sciences Research Council supported this research. ■

*Written by Diana Yates.
Photo by Don Hamerman.*

RESEARCH



New NIH-funded research aims to improve prostate cancer outcomes

University of Illinois at Urbana-Champaign researchers recently received a \$1.8 million grant from the National Institutes of Health (NIH) to develop a new assay technology that could determine the effectiveness of cancer drug treatments and aid in disease prognosis. Led by Illinois Bioengineering Assistant Professor Andrew Smith, the team is focusing on detecting nucleic acid-based biomarkers in a single drop of a cancer patient's blood.

"Very few types of cancer can be detected or monitored using bodily fluids," noted Smith. "Instead, most cancers require invasive biopsies or imaging tests that cannot monitor changes in real time."

One such example is prostate cancer, which relies on a 1970s-era blood test—the prostate-specific antigen (PSA)—to screen for the disease. If a patient's PSA level is high, he has to undergo an invasive and painful biopsy to determine whether cancer is present or not.

These conventional biopsies are unable to distinguish between slow-growing tumors that may never cause the patient harm and more aggressive forms of the disease. As a result, some patients opt for radical treatments that may be unnecessary and could compromise their quality of life.

In addition, once a patient begins drug or radiation therapy it's difficult to monitor the effectiveness of the treatment. So, Smith and his team, which includes researchers from the Medical College of Wisconsin and the Mayo Clinic, are taking an entirely different approach. By frequently measuring the concentrations of microRNA biomarkers in a patient's blood during his cancer treatments, they believe they can determine precise therapeutic regimens for each patient.

"Early data on blood-based nucleic acids such as mRNA, microRNA, and DNA suggest that these may be a highly accurate indication of a patient's cancer that can allow rapid, non-invasive, and routine analysis to measure recurrence, spread, and

"If our study is successful over the next five years, our novel technology will fill a major clinical gap in knowledge, essentially allowing us to match and finely tune prostate cancer treatments to individual molecular profiles."

therapy response," said Smith, part of the IGB's Omics Nanotechnology for Cancer Precision Medicine theme and a faculty member at the Micro + Nanotechnology Lab.

According to Smith, the assay technology they are developing will be the first to read out nucleic acids from a single drop of blood. "Numerous technologies exist to measure the levels of nucleic acids—for example PCR, gene arrays, and sequencing—but none match the major challenges presented by single blood-droplet analysis needed for this clinical practice to succeed," said Smith.

Smith's team is able to measure the nucleic acids in such a small blood sample because they know how to amplify signals from a single molecule using light-emitting quantum dots and electric field-enhancing photonic crystals.

Specifically, Smith and members of his lab (Lucas Smith and Yang Liu) are developing single-molecule optical tests for blood nucleic acids. Fellow Bioengineering faculty member Brian Cunningham, who is also an electrical and computer engineering professor, will adapt the test to mobile detection platforms that will allow patients to test their own blood at home.

The team will test its assay technology in a trial involving 100 patients with metastatic prostate cancer from the Mayo Clinic in Rochester, Minnesota. Patients will use the assay tool to draw a single drop of their own blood at home and the researchers will then use these samples to predict how individual patients will respond to prescribed cancer treatments.

Mayo Clinic oncologist and team member Manish Kohli will lead this portion of the research study. In addition, he will conduct retrospective analysis on a large repository of prostate cancer patient blood samples.

Other collaborators on the project include Liang Wang, a professor of pathology at the Medical College of Wisconsin and Rebecca Smith, an assistant professor of epidemiology at the Illinois College of Veterinary Medicine.

"If our study is successful over the next five years, our novel technology will fill a major clinical gap in knowledge, essentially allowing us to match and finely tune prostate cancer treatments to individual molecular profiles," said Smith. ■

*Written by Laura Schmitt.
Photos courtesy of Dept. of Bioengineering.*

MONTHLY PROFILE



Professor of Crop Science Stephen Moose discovers genes that influence corn and related bioenergy grasses' response to nitrogen supply, develops new approaches to increase crop yields with lower input costs and helps mitigate environmental issues associated with nitrogen fertilizer. His work reveals how genes cooperate to control plant traits important to both productivity and nutritional quality.

Stephen Moose: Bringing science back to the farm

On the south side of the University of Illinois campus, a set of farm plots grow a variety of crops that are being studied and tested for productivity and efficiency. These plots are where Stephen Moose's research begins.

After growing up on a farm in Ohio, becoming interested in genetics at a young age, and spending time working in industry, Moose is now a researcher at Illinois who is proud of the fact that he knows how to grow crops like a farmer does.

"I was a farmer who became a scientist, and now I'm a scientist who wants to take it back to the farm," he said.

Moose, a professor of crop sciences, was one of the first people hired on the Illinois campus whose job description included the word "genomics." This was years before the IGB was formed, and Moose knew that the emerging field of genomics would change his research in crop biotechnology. But scientists didn't yet have the technology to understand what this change would mean.

"We knew there was genetics, but a lot of it was a black box," he said. "Now, we can actually look at it."

Most of Moose's research focused on corn, but it has now evolved to include using genomics to unlock the full potential of both corn and bioenergy crops.

Moose, an affiliate of IGB's GEGC theme and faculty in the BSD theme, recently became involved with the Center for Advanced Bioenergy and Bioproducts Innovation, or CABBI. This multi-institution research collaboration aims to research and develop sustainable biofuels and bioproducts. Moose is leading feedstock development, one of the project's priority areas, which aims to use plants as "factories" and engineer them to produce biofuels and bioproducts in their stems.

Bioenergy involves using the natural products in plants to create energy. Moose's work will involve figuring out how to redirect carbon in bioenergy crops to make the plant more productive overall. Most of the time, carbon is shipped to the seeds. It will sometimes stay in the plant's stem, but carbon there is difficult to break down.

"The challenge of bioenergy is to unlock all that carbon, or at least some of it, into forms that we can then use as energy," Moose said.

What Moose and his colleagues hope to do is trick the stem into acting like a seed, so that it stores more sugar or makes oil, like seeds do. The goal is to make the stem just as productive as other parts of the plant.

To be able to do this, Moose and his colleagues first have to understand the contents of the plant's genome, which is challenging because of their complexity. Some of the bioenergy crops Moose studies have two or more copies of a genome. He compares this challenge to solving jigsaw puzzles.

"It's hard enough to put together one puzzle at a time," he said. "But think if I was putting together eight that looked a lot alike, at the same time."

The added challenge is figuring out what parts of the genome to target so they can be manipulated through gene editing. Much like a word processor, genome editing lets scientists edit, insert, delete, copy and paste individual genes.

As genome editing has advanced, scientists have been able to make changes that are more precise. This is good news for Moose's work, which aims to make specific changes to plant genomes that will make the plant more productive.

Moose and his colleagues want to improve bioenergy in a way that's economically viable to farmers, processors, and customers—and in a

way that doesn't compete with food production.

Other areas of Moose's research focus on understanding the mechanics behind things farmers typically use—such as nitrogen fertilizer and hybrid crops. Moose wants to understand why nitrogen increases the size of corn and why hybrids are more successful. By understanding the biological processes behind these two common practices, scientists could figure out how to grow crops just as well with less nitrogen, or discover a new hybrid that will add to genetic diversity.

Moose said the most rewarding thing about his research is that he's able to grow corn like a farmer and then link it back to the lab.

"You've got to grow them all the way to the end to make seeds, and you have to deal with weather," he said. "So it's challenging because a lot of people don't want to deal with Mother Nature ... but it's the variables and how the plant deals with those is what really is important."

It's a difficult process, but is also the most rewarding one for Moose.

"Starting out 20 years ago, I didn't know if it would be possible to actually do this the way I've tried to do it, and would I have the patience for it," he said. "But it's starting to pay off now."

He believes this is where university research thrives. University researchers can take on difficult projects and see them through.

When Moose first came to Illinois, he began working on an ongoing experiment that began in 1896 that tested corn samples for different traits. It's one of the longest-running genetics experiments in plants. That research continues today.

"Universities can do this kind of thing," he said. "I think that's where I fit into the story." ■

Written by Emily Scott. Photo courtesy of CABBI.

AWARD



2018 Wolf Prize in Agriculture awarded to IGB Director

IGB Director Gene Robinson has been awarded the 2018 Wolf Prize in Agriculture for “leading the genomics revolution in the organismal and population biology of the honey bee.”

Awarded each year since 1978 by the Wolf Foundation in the fields of agriculture, chemistry, mathematics, medicine, physics, and rotated among disciplines in the arts, recipients are considered outstanding members in their field. Laureates receive their awards from the President of the State of Israel, with a special ceremony held at the parliamentary building in Jerusalem.

“I am deeply honored to receive this award,” said Robinson. “The new science of genomics has truly revolutionized how we study all organisms, including honey bees, whose intricate social life enables them to play a vital but often overlooked role in world agriculture as the premier pollinator on the planet.”

Robinson earned his PhD from Cornell University in 1986 and has been a faculty member of the University of Illinois since 1989, holding the Swanlund Chair in Entomology and Center for Advanced Study Professorships in Entomology and Neuroscience. He is the former director of the campus Neuroscience Program, director of the Bee Research Facili-

ty, and has served as director of the IGB since 2011.

Employing genomics and systems biology to study the mechanisms and evolution of social life using the Western honey bee as a model

“I am deeply honored to receive this award. The new science of genomics has truly revolutionized how we study all organisms, including honey bees, whose intricate social life enables them to play a vital but often overlooked role in world agriculture as the premier pollinator on the planet.”

organism, Robinson’s lab has made significant advances in the understanding of the role of genes, hormones, and neurochemicals in the

mechanisms and evolution of social behavior, as well as discovering the first gene in regulating the division of labor within honey bee colonies.

Robinson has served on the National Institute of Mental Health Advisory Council and has past and current appointments on scientific advisory boards for academic organizations and companies with significant interests in genomics. His honors include Fellow and Founders Memorial Award, Entomological Society of America; Fellow and Distinguished Behaviorist, Animal Behavior Society; Distinguished Scientist Award, International Behavioral Genetics Society; Guggenheim Fellowship; Fulbright Fellowship; NIH Pioneer Award; Honorary Doctorate, Hebrew University; Fellow, American Academy of Arts & Sciences; and member, US National Academy of Sciences.

Over 250 scientists and artists from more than 20 countries have been honored since the Wolf Foundation was established. Recipients are chosen for their achievements towards humanity and for friendly relations between peoples, regardless of nationality, race, color, religion, gender, or political outlook, selected by an international awards committee. ■

Photo by Kathryn Faith.

ON THE GRID HAPPENINGS AT THE IGB

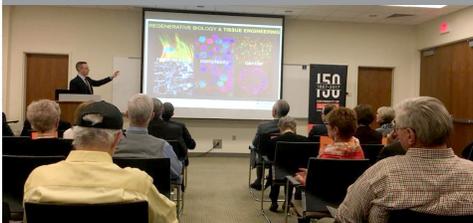
AWARDS



RASHID BASHIR

Rashid Bashir, Grainger Distinguished Chair of Bioengineering (ONC-PM/RBTE) was selected as a Royal Society of Chemistry (RSC) fellow in recognition of his research contributions in the broad field of BioMEMS and biomedical nanotechnology.

ALUMNI



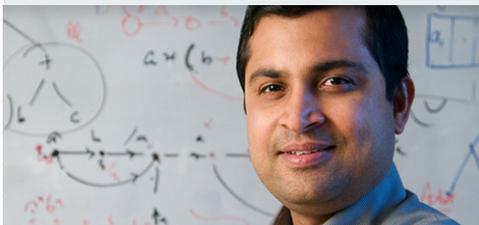
LAS ALUMNI ASSOCIATION HOSTS EVENT AT IGB

The College of Liberal Arts and Sciences (LAS) Alumni Association hosted an event at the IGB on the evening of April 5, for their alumni to hear from current LAS faculty members at the IGB speak about their research.

LAS Dean Feng Sheng Hu led the program, joined by IGB Director Gene Robinson. Following their remarks were three lightning talks by IGB members who have home departments in LAS: Brendan Harley, Associate Professor

and Robert W. Schaefer Faculty Scholar in the department of Chemical and Biomolecular Engineering and leader of IGB's Regenerative Biology & Tissue Engineering research theme; Paul Hergenrother, Kenneth L. Rinehart Jr. Endowed Chair in Natural Products Chemistry, Professor of Chemistry and leader of our Anticancer Discovery from Pets to People research theme; and Donald Ort, Robert Emerson Professor of Plant Biology and leader of the Genomic Ecology of Global Change research theme.

Attendees were treated to a tour of the IGB and its laboratories, jointly led by IGB and LAS leadership, and had a chance to speak further with IGB members. A successful example of campus collaboration, Dean Hu remarked "This is the first time an academic college is partnering with a research institute on an alumni event." Our thanks to LAS, the Alumni Association, and all the wonderful attendees who spent their evening with us.



SAURABH SINHA

Saurabh Sinha, Professor of Computer Science (GNBP/BS) was named an American Institute for Medical and Biological Engineering (AIMBE) Fellow for seminal bioinformatics methods in understanding gene regulation, including characterization of motifs, enhancers and the cis-regulatory code.

FELLOWS

IGB FELLOWS SYMPOSIUM

IGB FELLOWS SYMPOSIUM

Current IGB research and issues in the life sciences will be presented during a day-long series of lectures by faculty, students, and fellows from across campus at the IGB's annual Fellows Symposium. Claire Fraser, Professor and Director of the Institute for Genome Sciences, University of Maryland School of Medicine joins Benjamin Garcia, former IGB Fellows and Presidential Professor of Biochemistry and Biophysics, Perelman School of Medicine, University of Pennsylvania as the featured keynote speakers.

Register today at <http://fellows.igb.illinois.edu>.

CAMP



POLLEN POWER SUMMER CAMP

Pollen Power, the IGB summer camp for girls to study plants and the environment, create fiber optic flowers, use million dollar microscopes to view pollen, and more is now accepting campers. Research groups will give campers first-hand experience in a research environment with female mentors. The camp is designed for girls who are entering 6th, 7th or 8th grade in Fall 2018, and who have an interest in plants and the environment.

Full details and registration at <https://pollen-summercamp.illinois.edu/>.

NEW ARRIVALS



LISA MCCLELLAN

Lisa McClellan has joined the IGB Business Office as an Account Technician I, working with the Grants Team. Lisa most recently worked at Dow AgroSciences-Mycogen Seeds for 18 years, the last ten years as the Administrative Assistant.

ON THE GRID HAPPENINGS AT THE IGB

NEW ARRIVALS



DREAAM HOUSE VISITS THE IGB

The IGB outreach team is dedicated to providing genomics education to all individuals through our events and programming. One of the ways in which we seek to accomplish this is by offering field trips to the IGB for students in all grade levels in Champaign-Urbana and surrounding areas. We aim to create a day full of hands-on activities to help students understand the science behind some of the problems that researchers here at the IGB are working to solve. We create a series of science activities related to various IGB research themes, and offer these field trips a few times throughout the school semester so students from schools in Champaign-Urbana and surrounding areas have the opportunity to visit the university and the IGB.

On March 15, IGB hosted students from DREAAM House (Driven to Reach Excellence and Academic Achievement for Males), a school-to-college pipeline program that works with at-risk boys and teens to support them in their socio-emotional and academic development. By providing transformative experiences to increase positive outcomes such as academic achievement and college readiness, DREAAM House hopes to decrease negative outcomes for which this demographic is at risk for, including juvenile delinquency, gun violence, and gang activity. DREAAM House has designed a comprehensive, year-round program to support and engage with students, including a summer jumpstart program, afterschool activities, one-on-one mentoring, and parent education. DREAAM House has partnered with the University of Illinois' Extension and School of Social Work and other community organizations to help fulfill their program goals.

IGB welcomed 12 students in grades 2-5 from schools across the Champaign-Urbana area during their spring vacation period. These students were taken on a tour of the IGB to

see researchers working in the labs and also to meet the Core Facilities team who showed the students some of the Core microscopes and the images they produce.

The theme of the day was DNA, and the outreach team worked together to lead the students in several DNA-related activities, such as building a DNA helix out of marshmallows and Twizzlers, and learning about DNA transcription and translation by building a keychain using a secret message decoded by using an amino acid codon chart. After lunch, the students donned their detective hats and learned about DNA techniques used in crime scene investigations, including DNA extraction and gel electrophoresis, to solve their own fruit murder mystery.

Our thanks to the DREAAM House attendees, volunteers, and supporters who helped make this visit possible.

RECENT PUBLICATIONS

Please include your connection to the IGB in your author byline when submitting publications, as it will greatly help track potential newsworthy items and increase the possibility of coverage.

Seo, S., Chang, T. W., & Liu, G. L. (2018). 3D Plasmon Coupling Assisted Sers on Nanoparticle-Nanocup Array Hybrids. *Scientific Reports*, 8(1), [3002]. DOI: 10.1038/s41598-018-19256-7

Schoville, S. D., Chen, Y. H., Andersson, M. N., Benoit, J. B., Bhandari, A., Bowsher, J. H., ... Smagghe, G. (2018). A model species for agricultural pest genomics: The genome of the Colorado potato beetle, *Leptinotarsa decemlineata* (Coleoptera: Chrysomelidae). *Scientific Reports*, 8(1), [1931]. DOI: 10.1038/s41598-018-20154-1

Liu, D., Ray, B., Neavin, D. R., Zhang, J., Athreya, A. P., Biernacka, J. M., ... Weinshilboum, R. M. (2018). Beta-defensin 1, aryl hydrocarbon receptor and plasma kynurenine in major depressive disorder: Metabolomics-informed genomics. *Translational Psychiatry*, 8(1), [56]. DOI: 10.1038/s41398-017-0056-8

Głowacka, K., Kromdijk, J., Kucera, K., Xie, J., Cavanagh, A. P., Leonelli, L., ... Long, S. P. (2018). Photosystem II Subunit S overexpression increases the efficiency of water use in a field-grown crop. *Nature Communications*, 9(1), [868]. DOI: 10.1038/s41467-018-03231-x

Ammar, E. M., Wang, X., & Rao, C. V. (2018). Regulation of metabolism in *Escherichia coli* during growth on mixtures of the non-glucose sugars: Arabinose, lactose, and xylose. *Scientific Reports*, 8(1), [609]. DOI: 10.1038/s41598-017-18704-0

Xia, P. F., Li, Q., Tan, L. R., Liu, M. M., Jin, Y. S., & Wang, S. G. (2018). Synthetic Whole-Cell Biodevices for Targeted Degradation of Antibiotics. *Scientific Reports*, 8(1), [2906]. DOI: 10.1038/s41598-018-21350-9

Cao, J., Perez-Pinera, P., Lowenhaupt, K., Wu, M. R., Purcell, O., De La Fuente-Nunez, C., & Lu, T. K. (2018). Versatile and on-demand biologics co-production in yeast. *Nature Communications*, 9(1), [77]. DOI: 10.1038/s41467-017-02587-w

RECENT PUBLICATIONS

- Cao, P., Dahmen, K. A., Kushima, A., Wright, W. J., Park, H. S., Short, M. P., & Yip, S. (2018). Nanomechanics of slip avalanches in amorphous plasticity. *Journal of the Mechanics and Physics of Solids*, 114, 158-171. DOI: 10.1016/j.jmps.2018.02.012
- Farrell, A. K., Slatcher, R. B., Tobin, E. T., Imami, L., Wildman, D. E., Luca, F., & Zilioli, S. (2018). Socioeconomic status, family negative emotional climate, and anti-inflammatory gene expression among youth with asthma. *Psychoneuroendocrinology*, 91, 62-67. DOI: 10.1016/j.psyneuen.2018.02.011
- Greenwood, M. P., Greenwood, M., Romanova, E. V., Mecawi, A. S., Paterson, A., Sarenac, O., ... Murphy, D. (2018). The effects of aging on biosynthetic processes in the rat hypothalamic osmoregulatory neuroendocrine system. *Neurobiology of Aging*, 65, 178-191. DOI: 10.1016/j.neurobiolaging.2018.01.008
- Yun, E. J., Lee, J., Kim, D. H., Kim, J., Kim, S., Jin, Y. S., & Kim, K. H. (2018). Metabolomic elucidation of the effects of media and carbon sources on fatty acid production by *Yarrowia lipolytica*. *Journal of Biotechnology*, 272-273, 7-13. DOI: 10.1016/j.jbiotec.2018.02.011
- Wolz, K. J., Branham, B. E., & DeLucia, E. H. (2018). Reduced nitrogen losses after conversion of row crop agriculture to alley cropping with mixed fruit and nut trees. *Agriculture, Ecosystems and Environment*, 258, 172-181. DOI: 10.1016/j.agee.2018.02.024
- Springer, M. S., Murphy, W. J., & Roca, A. L. (2018). Appropriate fossil calibrations and tree constraints uphold the Mesozoic divergence of solenodons from other extant mammals. *Molecular Phylogenetics and Evolution*, 121, 158-165. DOI: 10.1016/j.ympev.2018.01.007
- Allen, J. M., Mailing, L. J., Niemi, G. M., Moore, R., Cook, M. D., White, B. A., ... Woods, J. A. (2018). Exercise Alters Gut Microbiota Composition and Function in Lean and Obese Humans. *Medicine and Science in Sports and Exercise*, 50(4), 747-757. DOI: 10.1249/MSS.0000000000001495
- Pomatto, V., Cottone, E., Cocci, P., Mozzicafreddo, M., Mosconi, G., Nelson, E. R., ... Bovolin, P. (2018). Plasticizers used in food-contact materials affect adipogenesis in 3T3-L1 cells. *Journal of Steroid Biochemistry and Molecular Biology*, 178, 322-332. DOI: 10.1016/j.jsbmb.2018.01.014
- Ahmadi, P., Cai, X. M., & Khanna, M. (2018). Multicriterion optimal electric drive vehicle selection based on lifecycle emission and lifecycle cost. *International Journal of Energy Research*, 42(4), 1496-1510. DOI: 10.1002/er.3937
- Potter, B. A., Beaudoin, A. B., Haynes, C. V., Holliday, V. T., Holmes, C. E., Ives, J. W., ... Surovell, T. (2018). Arrival routes of first Americans uncertain. *Science*, 359(6381), 1224-1225. DOI: 10.1126/science.aar8233
- Ulrich, E. C., Bougioukou, D. J., & Van Der Donk, W. A. (2018). Investigation of Amide Bond Formation during Dehydrophos Biosynthesis. *ACS Chemical Biology*, 13(3), 537-541. DOI: 10.1021/acschembio.7b00949
- Nickel, L. B., Roberts, B. W., & Chernyshenko, O. S. (2018). No Evidence of a Curvilinear Relation Between Conscientiousness and Relationship, Work, and Health Outcomes. *Journal of Personality and Social Psychology*. DOI: 10.1037/pspp0000176
- Christensen, S., Molloy, E. K., Vachaspati, P., & Warnow, T. (2018). OCTAL: Optimal Completion of gene trees in polynomial time. *Algorithms for Molecular Biology*, 13(1), [6]. DOI: 10.1186/s13015-018-0124-5
- Lu, X., Katz, J. S., Schmitt, A. K., & Moore, J. S. (2018). A Robust Oil-in-Oil Emulsion for the Nonaqueous Encapsulation of Hydrophilic Payloads. *Journal of the American Chemical Society*, 140(10), 3619-3625. DOI: 10.1021/jacs.7b11847
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