IGB NEWS

Upcoming Events
Monthly Profiles
Happenings at IGB

Image Of The Month
Research News
Department Announcements

Volume 12 Number 5

UPCOMING EVENTS

2019 David Gottlieb Memorial Lecture

Chemistry and Biology of Plant Natural Products
September 16, 2019, 4:00 p.m.
116 Roger Adams Laboratory

Sarah E. O'Connor, PhD
Director, Department of Natural Product Biosynthesis Max Planck Institute for Chemical Ecology
Jena, Germany

IGB Pioneers Seminar - GNDP

Integrating Single Cell Subcellular Biology in the Quest for Emergent Biologies
September 17, 2019, 12:00 p.m.
612 Carl R. Woese Institute for Genomic Biology

James Eberwine, PhD
University of Pennsylvania Perelman School of Medicine
Professor of Systems Pharmacology and Translational Therapeutics
Co-Director Penn Program in Single Cell Biology

IGB Seminar - ONC-PM

AMARETTO for network biology and medicine: linking diseases, drivers, targets and drugs via graph-based fusion of multi-omics, clinical, imaging and perturbation data
September 24, 2019, 12:00 p.m.
612 Carl R. Woese Institute for Genomic Biology

Nathalie Pochet, PhD
Broad Institute, Brigham and Women's Hospital, Harvard Medical School
Assistant Professor of Neurology

IGB Seminar - MMG

October 1, 2019, 12:00 p.m.
612 Carl R. Woese Institute for Genomic Biology

John Glass, PhD
J. Craig Venter Institute;
Professor and Leader of the Synthetic Biology & Bioenergy Group

FEATURED NEWS

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'Fettuccine' may be most obvious sign of life on Mars

3

Improved model better predicts crop yield, climate change effects

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Monthly Profile: Cari Vanderpool

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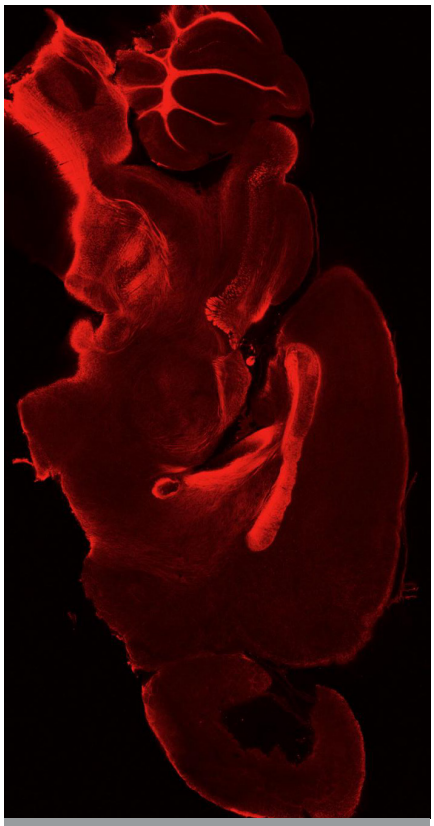
On the Grid: Happenings at IGB

IMAGE OF THE MONTH



This month features a tile scan of a sagittal brain section of a cuprizone-fed mouse. The characteristic demyelination in the caudal corpus callosum can be seen. This mouse was sacrificed during the remyelination phase. The image was obtained with the LSM 710 after CLARITY tissue clearing and subsequent staining with anti-proteolipid protein. Image courtesy of Allison Yukiko Louie from the Andrew Steelman Lab.

IGB News

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

‘Fettuccine’ may be most obvious sign of life on Mars

A rover scanning the surface of Mars for evidence of life might want to check for rocks that look like pasta, researchers report in the journal Astrobiology.

The bacterium that controls the formation of such rocks on Earth is ancient and thrives in harsh environments that are similar to conditions on Mars, said University of Illinois geology and microbiology professor Bruce Fouke (BCXT), who led the new, NASA-funded study.

“It has an unusual name, *Sulfurihydrogenibium yellowstonense*,” he said. “We just call it ‘Sulfuri.’”

The bacterium belongs to a lineage that evolved prior to the oxygenation of Earth roughly 2.35 billion years ago, Fouke said. It can survive in extremely hot, fast-flowing water bubbling up from underground hot springs. It can withstand exposure to ultraviolet light and survives only in environments with extremely low oxygen levels, using sulfur and carbon dioxide as energy sources.

“Taken together, these traits make it a prime candidate for colonizing Mars and other planets,” Fouke said.

And because it catalyzes the formation of crystalline rock formations that look like layers of pasta, it would be a relatively easy life form to detect on other planets, he said.

The unique shape and structure of rocks associated with Sulfuri result from its unusual lifestyle, Fouke said. In fast-flowing water, Sulfuri bacteria latch on to one another “and hang on for dear life,” he said.

“They form tightly wound cables that wave like a flag that is fixed on one end,” he said. The waving cables keep other microbes from attaching. Sulfuri also defends itself by oozing a slippery mucus.

“These Sulfuri cables look amazingly like fettuccine pasta, while further downstream they look more like capellini pasta,” Fouke said. The researchers used sterilized pasta forks to collect their samples from Mammoth Hot Springs in Yellowstone National Park.

Researchers—including, from left, Illinois geology professors Robert Sanford and Bruce Fouke; Bucknell University undergraduate student Kyle Fouke; Glenn Fried, the director of the IGB’s Core Facilities; and Mayandi Sivaguru, the associate director of IGB’s Core Facilities—analyzed a bacterium with characteristics that make it a good candidate for life on other planets.

The team analyzed the microbial genomes, evaluated which genes were being actively translated into proteins and deciphered the organism’s metabolic needs, Fouke said.

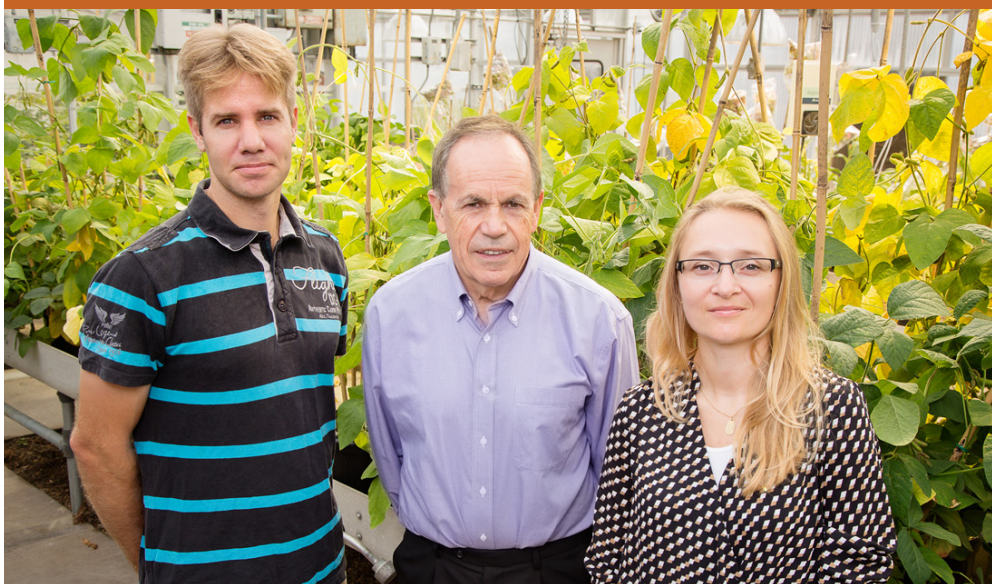
The team also looked at Sulfuri’s rock-building capabilities, finding that proteins on the bacterial surface speed up the rate at which calcium carbonate – also called travertine – crystallizes in and around the cables “1 billion times faster than in any other natural environment on Earth,” Fouke said. The result is the deposition of broad swaths of hardened rock with an undulating, filamentous texture.

“This should be an easy form of fossilized life for a rover to detect on other planets,” Fouke said.

“If we see the deposition of this kind of extensive filamentous rock on other planets, we would know it’s a fingerprint of life,” Fouke said. “It’s big and it’s unique. No other rocks look like this. It would be definitive evidence of the presences of alien microbes.” ■

Written by Diana Yates. Photos by Bruce W. Fouke, L. Brian Stauffer

In fast-flowing hot springs, the microbe scientists call ‘Sulfuri’ assembles itself into pasta-like strands and promotes the crystallization of calcium carbonate rock—also known as travertine—along its surfaces.



Improved model better predicts
crop yield, climate change effects

A new computer model incorporates how microscopic pores on leaves may open in response to light—an advance that could help scientists create virtual plants to predict how higher temperatures and rising levels of carbon dioxide will affect food crops, according to a study published in a special issue of the journal *Photosynthesis Research* today.

"This is an exciting new computer model that could help us make much more accurate predictions across a wide range of conditions," said Johannes Kromdijk, who led the work as part of an international research project called Realizing Increased Photosynthetic Efficiency (RIPE).

RIPE, which is led by the University of Illinois, is engineering crops to be more productive without using more water by improving photosynthesis, the natural process all plants utilize to convert sunlight into energy to fuel growth and crop yields. RIPE is supported by the Bill & Melinda Gates Foundation, the U.S. Foundation for Food and Agriculture Research (FFAR), and the U.K. Government's Department for International Development (DFID).

The current work focused on simulating the behavior of what are known as stomata—microscopic pores in leaves that, in response to light, open to allow water, carbon dioxide, and oxygen to enter and exit the plant. In 2018, the RIPE team published a paper in *Nature Communications* that showed increasing one specific protein could prompt plants to close their stomata partially—to a point where photosynthesis was unaffected, but water loss decreased significantly. This study's experimental data was used to create the newly improved stomata model introduced today.

"We've known for decades that photosynthesis and stomatal opening are closely coordinated, but just how this works has remained uncertain," said Stephen Long, Ikenberry Endowed University Chair of Crop Sciences and Plant Biology at the University of Illinois. "With this new computer model, we have a much better tool for calculating stomatal movements in response to light."

(above) From left to right, scientists Johannes Kromdijk, Stephen Long, and Katarzyna Glowacka improved a model used to make crop predictions by incorporating how microscopic, mouth-like pores on leaves may open in response to light.

The ultimate goal, Long said, is to identify opportunities to control these stomatal gatekeepers to make drought-tolerant crops. "Now we're closing in on the missing link: How photosynthesis tells stomates when to open."

Computer modeling has been a major advance in crop breeding. The father of modern genetics, Gregor Mendel, made his breakthrough discovery that pea plants inherit traits from their parents by growing and breeding more than 10,000 pea plants over eight years. Today, plant scientists can virtually grow thousands of crops in a matter of seconds using these complex computer models that simulate plant growth.

Stomatal models are used together with models for photosynthesis to make wide-ranging predictions from future crop yields to crop management, such as how crops respond when there is a water deficit. In addition, these models can give scientists a preview of how crops like wheat, maize, or rice could be affected by rising carbon dioxide levels and higher temperatures.

"The previous version of the stomatal model used a relationship that wasn't consistent with our current understanding of stomatal movements," said Kromdijk, now a University Lecturer at the University of Cambridge. "We found that our new version needs far less tuning to make highly accurate predictions."

Still, there's a lot of work to be done to show that this modified model functions in a wide variety of applications and to underpin the relationship between stomata and photosynthesis further.

"We have to show that this model works for a diverse range of species and locations," said former RIPE member Katarzyna Glowacka, now an assistant professor at the University of Nebraska-Lincoln. "Large-scale simulation models string together models for atmospheric turbulence, light interception, soil water availability, and others—so we have to convince several research communities that this is an improvement that is worth making." ■

Written by Claire Benjamin. Photos by Johannes Kromdijk, L. Brian Stauffer

Carin (Cari) Vanderpool is a Professor of Microbiology whose lab focuses on a variety of projects in genetics, genomics, microbial physiology, protein-nucleic acid interactions, regulation of gene expression, RNA biology, and signal transduction.

Cari Vanderpool

Constructing networks in regulons and research communities

Cari Vanderpool (MME) doesn't study microbes because they are scary; she studies them because they are cool.

"When people find out I'm a microbiologist, they ask, are you totally freaked out by public places?" Vanderpool said, noting a common reaction to her work. "Actually the opposite: I know microbes are everywhere, you can't get away from them . . . microbes are our world, and most of them are good, not bad."

Vanderpool's interest in the molecular adaptability of bacteria has its origins in her experiences as an undergraduate at Purdue University, and led to her PhD in microbiology from the University of Minnesota and postdoctoral fellowship in the Laboratory of Molecular Biology at the National Cancer Institute. At Illinois, she has refined her research program to focus on microbial genomic responses to environmental stressors.

"I started out in undergrad working kind of in an environmental microbiology lab . . . I moved to working on a pathogen in grad school, but we were still really fascinated by the biology of that microbe," Vanderpool said. "I've always been drawn to just understanding how things work and why they work the way they do."

She notes that microbes, as individual cells with no larger structure to buffer them from the surrounding environment, must be metabolically equipped to respond effectively to changing conditions. The Vanderpool Lab examines how mechanisms of gene regulation facilitate this responsiveness; the lab specializes in exploration of how the actions of small RNAs contribute to gene regulatory dynamics.

"These are molecules that really weren't appreciated as important regulators in cells until fifteen to twenty years ago . . . there's still a lot we don't know," Vanderpool said. "Small RNA molecules can affect protein production by changing the activity of an mRNA, whether it gets translated into protein or whether it gets degraded . . . in a lot of cases we don't understand how those molecular-level interactions affect the physiology and metabolism of the cell, and so that's an area that in particular my lab has focused on."

During her research career, Vanderpool has watched this research area and the larger field of genomics blossom as DNA sequencing became fast and cheap.

"The things we're able to do now or think about doing, mapping the transcriptome, mapping the ends of RNA molecules very precisely at single nucleotide resolution, mapping protein-RNA or protein-DNA interactions at single nucleotide resolution, we couldn't do those things ten years ago," she said. "So we don't have to work in model organisms anymore; we can work in any crazy organism we want to, because the world has changed with the advent of these kinds of sequencing technologies."

"In a lot of cases we don't understand how those molecular-level interactions affect the physiology and metabolism of the cell, and so that's an area that in particular my lab has focused on."

Vanderpool is taking advantage of this freedom by expanding her own research to include *Bacteroides*, a genus of bacteria that is common in human gut microbiota but uncommon in microbiology laboratories. In these microbes, as well as the more traditional non-pathogenic or pathogenic model systems, she has concentrated on pursuing questions that yield new insights into the basic biology of microbial stress response.

Her interest in fundamental research helped attract her to the University of Illinois, thanks to the Department of Microbiology's strong record of fundamental research in the natural history and biology of bacteria and other microbes. She appreciates the legacy of G. William Arends Professor in Molecular and Cellular Biology Abigail Salyers (1942-2013), who pioneered research of *Bacteroides* and other gut microbes. Vanderpool sees basic and applied research as equally crucial, mutually dependent scientific approaches.

"I became convinced that without understanding the fundamental biology, you can't smartly design therapeutics or other kinds of applications," she said. "My very favorite example as a microbiologist is CRISPR, because that was discovered just doing fundamental studies in model bacterial organisms . . . no one could have guessed that this weird little set of sequences that someone found in the *E. coli* genome would have led to this."

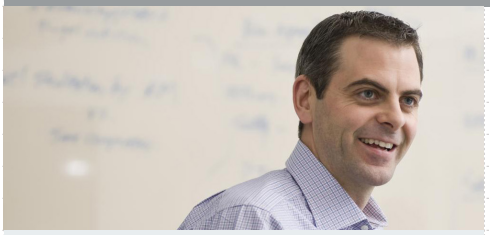
Vanderpool is now leading an initiative that continues this tradition of strong microbiology research, as well as another longstanding Illinois tradition of interdisciplinary collaboration. She is working with faculty across many campus units to organize the Microbial Systems Initiative, which aims to unify and support microbiology work at Illinois.

"There are folks who probably don't consider themselves to be in microbial sciences research, but for example are in engineering and have these really amazing tools that we could apply to studies of microbes or studies in the microbiome, and really break some new ground," Vanderpool said. "We're going to keep trying to build new collaborations and facilitate interdisciplinary research and education in microbial sciences . . . the IGB is a key piece, because there are already existing, minimally three, more like four or even five themes that are engaged in research on microbial systems, and so IGB is really a nucleus for that." ■

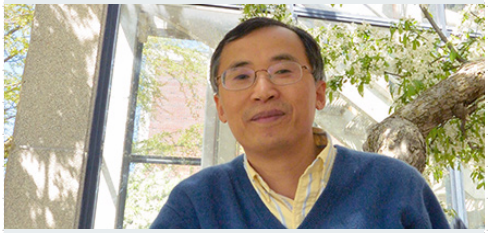
Written by Claudia Lutz.
Photo courtesy of the Vanderpool lab.

ON THE GRID
HAPPENINGS AT THE IGB

AWARDS

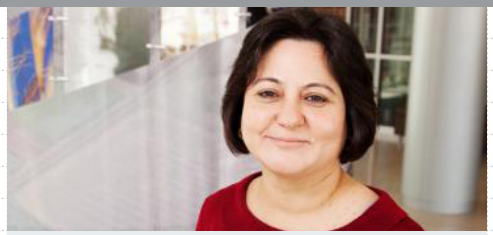


MARTIN BURKE
Martin Burke, Professor of Chemistry (MMG), was named a 2019 iCON Honoree which recognizes the accomplishments of outstanding innovators and leaders whose work provides the basis for life sciences developments worldwide.

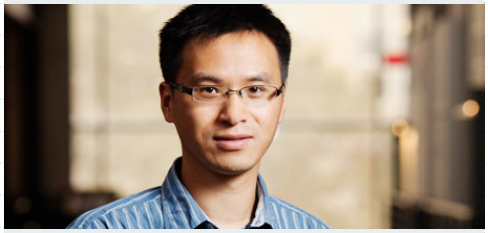


XIMING CAI
Ximing Cai, Professor of Civil and Environmental Engineering (CABBI) was named a 2019 Fellow of the American Geophysical Union (AGU). Fellows are recognized for their scientific eminence, remarkable breadth of interests, and scope of contributions.

AUINASH KALSOTRA AND HEIDEMARIE LAURENT
Auinash Kalsotra, Associate Professor of Biochemistry (GNDP/ONC-PM) and Heidemarie Laurent, Associate Professor of Psychology (CGRH/MME) received the 2019 Provost's Campus Distinguished Promotion Award for extraordinary contributions in terms of quality of work and overall achievement.



MADHU KHANNA
Madhu Khanna, ACES Distinguished Professor (CABBI), was elected to the DOE/USDA's Biomass Research and Development Technical Advisory Committee, which advises the Biomass R&D Board on R&D activities for the two agencies with the goal of expanding the bio-based industry.

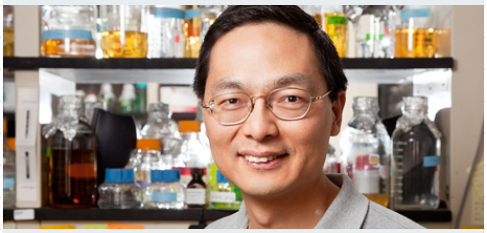


TING LU
Ting Lu, Associate Professor of Bioengineering (BSD/BCXT/CABBI/MME) received a Maximizing Investigators' Research Award (MIRA) from the National Institutes of Health, which provides funds for the nation's most highly talented and promising investigators, for his proposal "Integrative Circuit-Host Modeling of Synthetic Gene Networks."

RUBY MENDENHALL AND AMY WAGONER JOHNSON
Ruby Mendenhall, Associate Professor of Sociology (CGRH/GNDP) and Amy Wagoner Johnson, Professor of Mechanical Science and Engineering (CGRH/RBTE) were selected for the inaugural cohort of the Public Voices Fellowship, a system-wide program to help faculty amplify their expertise in ways that can contribute to public conversations about pressing issues.

JEFFREY MOORE
Jeffrey Moore, Murchison-Mallory Professor of Chemistry and Professor of Materials Science and Engineering (BSD), received the American Chemical Society Award in Polymer Chemistry, which recognizes outstanding fundamental contributions and achievements in the field.

BRUCE SCHATZ
Bruce Schatz, Professor of Computer Science and Head of the Department of Medical Information Science (CGRH), was named Associate Editor of the journal Nature Digital Medicine.



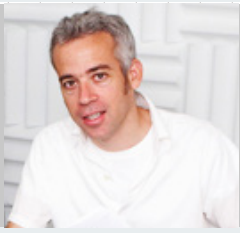
HUIMIN ZHAO
Huimin Zhao, Steven L. Miller Chair in Chemical and Biomolecular Engineering (BSD lead/CABBI/MMG), received the 2019 Enzyme Engineering Award, which recognizes outstanding achievement in the field of enzyme engineering, for pioneering contributions in the development of directed evolution for enzyme engineering.

ON THE GRID
HAPPENINGS AT THE IGB

NEW ARRIVALS

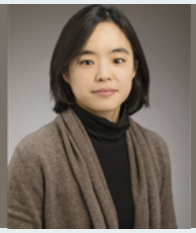
MOHAMMED EL-KEBIR

Professor Mohammed El-Kebir has joined the IGB as an affiliate in the Infection Genomics for One Health (IGOH) Research Theme. He is a faculty member in the Department of Computer Science. His research interests are in the areas of combinatorial optimization, cancer genomics, intra-tumor heterogeneity, phylogenetics and computational biology.



IDO GOLDING

Professor Ido Golding has joined the IGB as an affiliate in the Biocomplexity (BCXT) Research Theme. He is a faculty member in the Department of Physics, and was previously a professor of Biochemistry and Molecular Biology in the Baylor College of Medicine. Dr. Golding's research examines the way living cells process information about their environment and make decisions based on that information.



SANGJIN KIM

Professor Sangjin Kim has joined the IGB as an affiliate in the Biocomplexity (BCXT) Research Theme. She is a faculty member in the Department of Physics. Prior to joining the faculty, she received her PhD at Harvard University. Professor Kim's research combines her expertise in single molecule biophysics, microbiology and computational modeling to study the complexity of living cells at the single-molecule and single-cell levels.

PRAVEEN KUMAR

Professor Praveen Kumar has joined the IGB as an affiliate in the Genomic Ecology of Global Change (GEGC) Research Theme. He has been a faculty member in the Department of Civil and Environmental Engineering since 1995. Dr. Kumar's research deals with Hydrocomplexity, the quantitative understanding and prediction of emergent patterns of form and function that arise from complex non-linear multi-scale interactions between soil, water, climate, vegetation and human systems; and how this understanding can be used for innovative solutions to water and sustainability challenges.

CENTER

NEW WOESE UNDERGRADUATE SCHOLARS

Congratulations to our new Woese Undergraduate Scholarship awardees. Two of the most basic motivations that drive scientific research—exploration of the unknown and the desire to solve a pressing problem—are both represented by this year's scholars.

Allison Narlock will spend her summer investigating the mechanics of archaeal cell division, while Monika Ziogaite will be working to identify genetic variants that contribute to the metastatic potential of breast cancers.

CENTER

CATHERINE AND DON KLEINMUNTZ CENTER FOR GENOMICS IN BUSINESS AND SOCIETY

Following the launch of the Catherine and Don Kleinmuntz Center for Genomics in Business and Society in February of this year, we've seen several exciting developments follow.

We debuted the new Kleinmuntz Center website, which can be viewed at kleinmuntzcenter.illinois.edu for all the programs and events that are currently supported through the center. Also at the Kleinmuntz Center website can be found the recipients of the annual Mikashi Awards, resources committed by the Kleinmuntz Center to support innovations within a pre-commercialization proof of concept program. Our congratulations to the recipients this year, Donald Biggar Willett Professor of Engineering Dr. Brian Cunningham (ONC-PM leader/MMG) and Kenneth L. Rinehart Jr. Endowed Chair in Natural Products Chemistry Dr. Paul Hergenrother (ACPP leader/MMG).

Over the summer we held a networking event in the Chicago area where several IGB faculty presented short talks on their research, and we heard from campus leadership including Interim Vice Chancellor for Research Dr. Susan Martinis and a special message from University of Illinois President Timothy Killeen, with closing remarks from our generous hosts Catherine and Don Kleinmuntz.

DEPARTMENT ANNOUNCEMENTS

FACILITIES & SERVICES

OBFS EQUIPMENT REPORTING THRESHOLD INCREASED

The Office of Business and Financial Service (OBFS) recently released a notification that the equipment reporting threshold has been increased from $500 to $1000. This change will decrease the number of items that are required to be inventoried annually.

The most relevant points to be aware of from this update are:

- Assets over $1,000 will be assigned PTags via the normal purchasing route
- Assets under $1,000 (not consumable) will need "Property of State of Illinois, University of Illinois-UC" tags applied to them. IGB Office Administrator Kathy Millage has these tags and will be happy to provide them to you.

You can find additional information is available here, or you can contact Kathy at the email above or IGB Director of Operation and Facilities Jesse Southern. ■

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.

Pedron Haba, S., Wolter, G. L., Chen, J. W. E., Laken, S. E., Sarkaria, J. N., & Harley, B. A. (2019). Hyaluronic acid-functionalized gelatin hydrogels reveal extracellular matrix signals temper the efficacy of erlotinib against patient-derived glioblastoma specimens. *Biomaterials*, 219, [119371]. https://doi.org/10.1016/j.biomaterials.2019.119371

Zambuto SG, Clancy KBH, Harley BAC. A gelatin hydrogel to study endometrial angiogenesis and trophoblast invasion. *Interface Focus*. 2019;9(5). doi: 10.1098/rsfs.2019.0016

Hillson, N., Caddick, M., Cai, Y., Carrasco, J. A., Chang, M. W., Curach, N. C., ... Freemont, P. S. (2019). Author Correction: Building a global alliance of biofoundries (*Nature Communications*, (2019), 10, 1, (2040), 10.1038/s41467-019-10079-2). *Nature communications*, 10(1), [3132]. https://doi.org/10.1038/s41467-019-10862-1

Huang, L., Riggins, C. W., Rodriguez-Zas, S. L., Zabaloy, M. C., & Villamil, M. B. (2019). Long-term N fertilization imbalances potential N acquisition and transformations by soil microbes. *Science of the Total Environment*, 691, 562-571. https://doi.org/10.1016/j.scitotenv.2019.07.154

Ballance, W. C., Oh, I., Lai, Y., Elhebeary, M., Saif, M. T. A., Hu, Y., & Kong, H. J. (2019). Vibration at structural resonance frequency of hydrophilic substrates enhances biofilm removal. *Sensors and Actuators, B: Chemical*, 299, [126950]. https://doi.org/10.1016/j.snb.2019.126950

Chung, J., Lorenz, A., & Somaya, D. (2019). Dealing with intellectual property (IP) landmines: Defensive measures to address the problem of IP access. *Research Policy*, 48(9), [103828]. https://doi.org/10.1016/j.respol.2019.103828

Abueidda, D. W., Almasri, M., Ammourah, R., Ravaioli, U., Jasiuk, I. M., & Sobh, N. A. (2019). Prediction and optimization of mechanical properties of composites using convolutional neural networks. *Composite Structures*, 227, [111264]. https://doi.org/10.1016/j.compstruct.2019.111264

Wang, H., Bo, Y., Liu, Y., Xu, M., Cai, K., Wang, R., & Cheng, J. (2019). In vivo cancer targeting via glycopolyester nanoparticle mediated metabolic cell labeling followed by click reaction. *Biomaterials*, 218, [119305]. https://doi.org/10.1016/j.biomaterials.2019.119305

Meacham-Hensold, K., Montes, C. M., Wu, J., Guan, K., Fu, P., Ainsworth, E., ... Bernacchi, C. (2019). High-throughput field phenotyping using hyperspectral reflectance and partial least squares regression (PLSR) reveals genetic modifications to photosynthetic capacity. *Remote Sensing of Environment*, 231, [111176]. https://doi.org/10.1016/j.rse.2019.04.029

Harshman, S. W., Pitsch, R. L., Schaeublin, N. M., Smith, Z. K., Strayer, K. E., Phelps, M. S., ... Martin, J. A. (2019). Metabolomic stability of exercise-induced sweat. *Journal of Chromatography B: Analytical Technologies in the Biomedical and Life Sciences*, 1126-1127, [121763]. https://doi.org/10.1016/j.jchromb.2019.121763

Jayaraman, B., Lu, C., Whitman, J., & Chowdhary, G. (2019). Sparse feature map-based Markov models for nonlinear fluid flows. *Computers and Fluids*, 191, [104252]. https://doi.org/10.1016/j.compfluid.2019.104252

Abolins-Abols, M., Hanley, D., Moskát, C., Grim, T., & Hauber, M. E. (2019). Anti-parasitic egg rejection by great reed warblers (*Acrocephalus arundinaceus*) tracks differences along an eggshell color gradient. *Behavioural Processes*, 166, [103902]. https://doi.org/10.1016/j.beproc.2019.103902

RECENT PUBLICATIONS

Kurambhatti, C. V., Kumar, D., & Singh, V. (2019). Impact of Fractionation Process on the Technical and Economic Viability of Corn Dry Grind Ethanol Process. *Processes*, 7(9), 578. https://doi.org/10.3390/pr7090578

Scott, A. J., Alexander, J. L., Merrifield, C. A., Cunningham, D., Jobin, C., Brown, R., ... Kinross, J. M. (2019). International Cancer Microbiome Consortium consensus statement on the role of the human microbiome in carcinogenesis. *Gut*, 68(9), 1624-1632. https://doi.org/10.1136/gutjnl-2019-318556

Vishwanathan, G., & Juarez, G. (2019). Steady streaming flows in viscoelastic liquids. *Journal of Non-Newtonian Fluid Mechanics*, 271, [104143]. https://doi.org/10.1016/j.jnnfm.2019.07.007

Zhou, Z., Li, K., Yan, R., Yu, G., Gilpin, C. J., Jiang, W., & Irudayaraj, J. M. K. (2019). The transition structure of chromatin fibers at the nanoscale probed by cryogenic electron tomography. *Nanoscale*, 11(29), 13783-13789. https://doi.org/10.1039/c9nr02042j

Sweedler, J. V. (2019). Avoiding a Retraction: Some Simple Guidelines on What NOT to Do. *Analytical chemistry*, 91(15), 9331-9332. https://doi.org/10.1021/acs.analchem.9b03257

Sivaguru, M., Khaw, Y. M., & Inoue, M. (2019). A Confocal Reflection Super-Resolution Technique to Image Golgi-Cox Stained Neurons. *Journal of Microscopy*, 275(2), 115-130. https://doi.org/10.1111/jmi.12821

Zhang, X., Zhang, S., Zhao, Q., Ming, R. R., & Tang, H. (2019). Assembly of allele-aware, chromosomal-scale autopolyploid genomes based on Hi-C data. *Nature Plants*, 5(8), 833-845. https://doi.org/10.1038/s41477-019-0487-8

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