

IGB NEWS

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Research News

Department Announcements

Volume 11 Number 2

UPCOMING EVENTS

IGB Seminar (BCXT)

Linking Phage Infection and Biogeochemistry in the Sunlit Ocean

March 27, 2018, 12:00 p.m.

612 Carl R. Woese Institute for Genomic Biology

Maureen Coleman, PhD

University of Chicago

Department of Geophysical Sciences

Fox Family Innovation and Entrepreneurship Lecture

Entrepreneurial Success:

Executing Breakthrough Innovations

Semiconductor Nanocrystals

March 29, 2018, 12:00 p.m.

612 Carl R. Woese Institute for Genomic Biology

Catherine Kleinmuntz, PhD

Principal, Kleinmuntz Associates

IGB Pioneers Seminar (GEGC)

Molecular Signal Transduction Mechanisms

Mediating Drought-Induced and CO₂ Regulation

of Ion Channels and Plant Water Loss

April 10, 2018, 12:00 p.m.

612 Carl R. Woese Institute for Genomic Biology

Julian I. Schroeder, PhD

University of California, San Diego

Department of Biology

Art of Science 8.0 Opening Reception

April 12, 2018, 6:00 p.m.

Broadway Food Hall

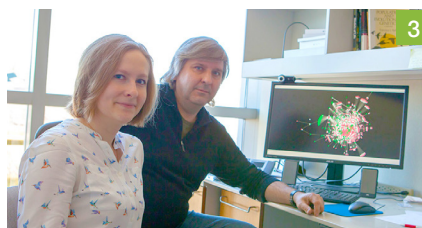
401 N. Broadway Avenue, Urbana

Showcasing imagery from the Core Facilities at the IGB, the Art of Science exhibit highlights cutting-edge research that is addressing significant problems in the environment, medicine, energy use and production, and fundamental research. Exhibit opens April 12 and will run through May 13.

FEATURED NEWS



Scientists engineer crops to conserve water, resist drought



Economic concept used to understand microbial communities

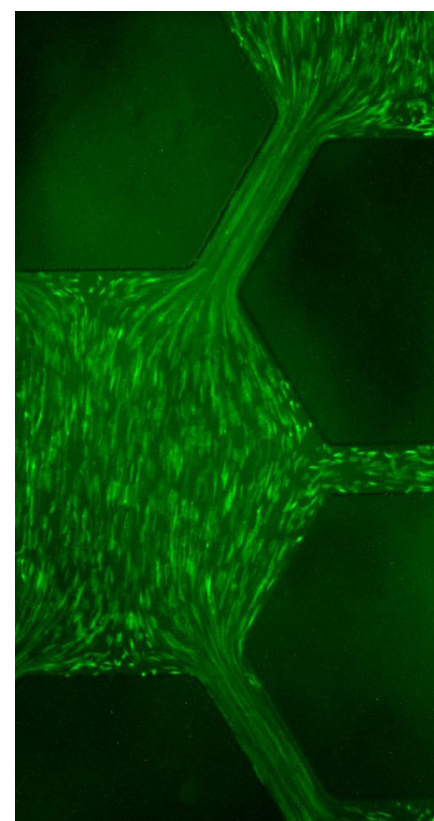


Monthly Profile:
Indrani Bagchi



On the Grid:
Happenings at IGB

IMAGE OF THE MONTH



This month features *E. coli* with GFP in a microfluidic chamber. An array of micro-scale hexagon wells interconnected with channels was built into the chamber to emulate a porous network. A linear concentration gradient of antibiotic ciprofloxacin was created across the well array, where *E. coli* cells with GFP were inoculate. Response of *E. coli* cells in the ciprofloxacin concentration gradient was observed in real-time. Image courtesy of Jinzi Deng, Bruce Fouke Lab.

IGB News

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

FEATURE



Scientists engineer crops to conserve water, resist drought

Agriculture already monopolizes 90 percent of global freshwater—yet production still needs to dramatically increase to feed and fuel this century's growing population. For the first time, scientists have improved how a crop uses water by 25 percent without compromising yield by altering the expression of one gene that is found in all plants, as reported in *Nature Communications*.

The research is part of the international research project Realizing Increased Photosynthetic Efficiency (RIPE) that is supported by the Bill & Melinda Gates Foundation, the Foundation for Food and Agriculture Research, and the U.K. Department for International Development.

"This is a major breakthrough," said RIPE Director Stephen Long, Ikenberry Endowed Chair of Plant Biology and Crop Sciences (above, middle). "Crop yields have steadily improved over the past 60 years, but the amount of water required to produce one ton of grain remains unchanged—which led most to assume that this factor could not change. Proving that our theory works in practice should open the door to much more research and development to achieve this all-important goal for the future."

The international team increased the levels of a photosynthetic protein (PsbS) to conserve water by tricking plants into partially closing their stomata, the microscopic pores in the leaf that allow water to escape. Stomata are the gatekeepers to plants: When open, carbon dioxide enters the plant to fuel photosynthesis, but water is allowed to escape through the process of transpiration.

"These plants had more water than they needed, but that won't always be the case," said co-first author Katarzyna Glowacka (above, right), a postdoctoral researcher who led this research at the IGB. "When water is limited, these modified plants will grow faster and

yield more—they will pay less of a penalty than their non-modified counterparts."

The team improved the plant's water-use-efficiency—the ratio of carbon dioxide entering the plant to water escaping—by 25 percent without significantly sacrificing photosynthesis or yield in real-world field trials. The carbon dioxide concentration in our atmosphere has increased by 25 percent in just the past 70 years, allowing the plant to amass enough carbon dioxide without fully opening its stomata. "Evolution has not kept pace with this rapid change, so scientists have given it a helping hand," said Long, who is also a professor of crop sciences at Lancaster University.

Four factors can trigger stomata to open and close: humidity, carbon dioxide levels in the plant, the quality of light, and the quantity of light. This study is the first report of hacking stomatal responses to the quantity of light.

PsbS is a key part of a signaling pathway in the plant that relays information about the quantity of light. By increasing PsbS, the signal says there is not enough light energy for the plant to photosynthesize, which triggers the stomata to close since carbon dioxide is not needed to fuel photosynthesis.

This research complements previous work, published in *Science*, which showed that increasing PsbS and two other proteins can improve photosynthesis and increase productivity by as much as 20 percent. Now the team plans to combine the gains from these two studies to improve production and water-use by balancing the expression of these three proteins.

For this study, the team tested their hypothesis using tobacco, a model crop that is easier to modify and faster to test than other crops. Now they will apply their discoveries to improve the water-use-efficiency of food crops and test their efficacy in water-limited conditions.

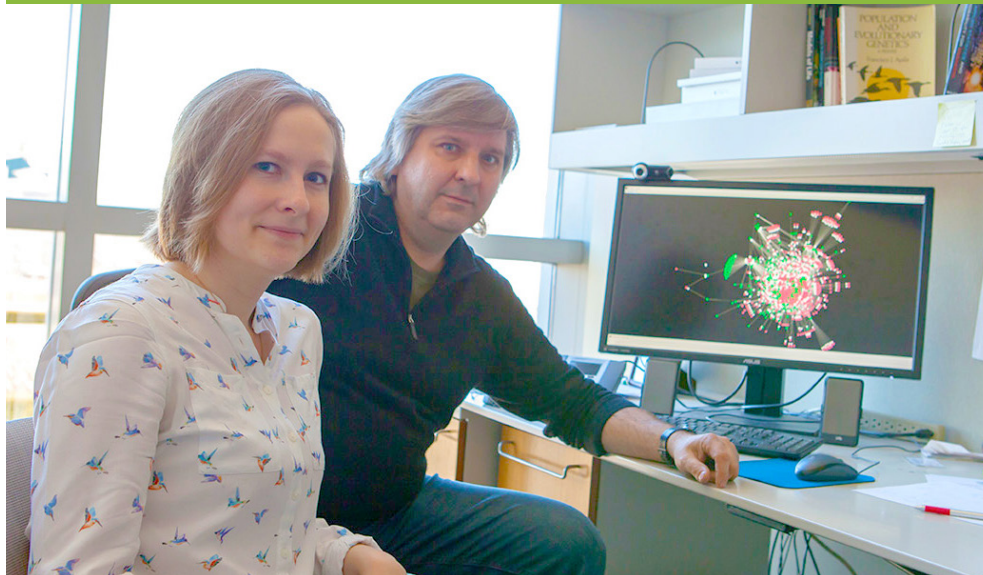
"Making crop plants more water-use efficient is arguably the greatest challenge for current and future plant scientists," said co-first author Johannes Kromdijk, a postdoctoral researcher at the IGB (above, left). "Our results show that increased PsbS expression allows crop plants to be more conservative with water use, which we think will help to better distribute available water resources over the duration of the growing season and keep the crop more productive during dry spells."

The paper "Photosystem II subunit S Overexpression Increases the Efficiency of Water Use in a Field-Grown Crop" is available by request. Co-authors also include Illinois researchers Katherine Kucera, lab technician; Jiayang Xie, student; Amanda Cavanagh, postdoctoral researcher; Andrew Leakey, associate professor; Donald Ort, Robert Emerson Professor of Plant Biology and Crop Sciences; and from the University of California, Berkeley: Lauriebeth Leonelli, postdoctoral associate, and Professor Krishna Niyogi.

Realizing Increased Photosynthetic Efficiency (RIPE) is engineering crops to more efficiently turn the sun's energy into food to sustainably increase worldwide food productivity. The project is supported by the Bill & Melinda Gates Foundation, the Foundation for Food and Agriculture Research, and the U.K. Department for International Development.

RIPE is led by the University of Illinois in partnership with the University of Essex, Lancaster University, Australian National University, Chinese Academy of Sciences, Commonwealth Scientific and Industrial Research Organisation, University of California, Berkeley, and Louisiana State University, and USDA/ARS. ■

**Written by Claire Benjamin.
Photo by L. Brian Stauffer.**



Researchers use economic concept to understand microbial communities

A popular economic concept is helping IGB researchers understand how microbial communities operate.

Microbial communities are in our bodies, in the soil, in forests and oceans, and more. They're made up of microorganisms that interact with each other in various ways, and these interactions can affect the surrounding environment.

Researchers like Sergei Maslov, a Bliss Faculty Scholar and professor of bioengineering in the Bio-complexity theme (above, right), want to understand microbial communities so they can learn how to manipulate them.

These communities are extremely complex, but they are typically stable. Maslov worked with PhD student Veronika Dubinkina (above, left) and Akshit Goyal, a visiting scholar from the Simons Centre for the Study of Living Machines, to better understand how these stable states are formed, and to predict what would cause them to become unstable (doi: <https://doi.org/10.1101/235374>).

They created a conceptual model that uses a theoretical concept called the stable marriage problem, which was first proposed in the 1960s by two economists, David Gale and Lloyd Shapley, resulting in a 2012 Nobel Prize in economics.

The stable marriage problem explains how stable states are formed, and it applies to many real life situations. One example is how medical students are assigned to their first hospital appointments.

In this process, each student ranks the hospitals he or she prefers — a top choice, second choice, and so on. Similarly, hospitals review and rank which candidates they prefer. It's likely that these rankings

will conflict with each other — perhaps several students pick one hospital as their top choice, but the hospital can't accept all of them. So there needs to be a solution — a way to assign all of the students to hospitals in a way that is stable.

"The idea is that you can find those stable states by following a procedure which looks somewhat reminiscent of the way actual marriages are formed," Maslov said.

The solution to this problem, first proved by Gale and Shapley, involves a conceptual "game" with several rounds that starts with an equal number of men and women seeking to be married.

In the first round, each man proposes to a woman he most prefers to marry. If a woman in the group receives more than one proposal, she accepts the best proposal she's received so far and rejects the others.

Meanwhile, the men continue going down their list of preferred spouses, and the women keep accepting or rejecting. Gale and Shapley proved that by the end of this procedure, every person will be married and every marriage will be stable — which means that no couple prefers someone else to their current spouses.

Maslov and Dubinkina said a similar process happens in microbial communities. Microbes are actively looking for nutrients, and they want to get the best nutrients they can find. Competition between microbes may get in the way of them getting the best nutrients possible, but eventually, the microbes will settle into a stable state.

Their study paves the way for predictive and quantitative models in an area of research that often focuses on identifying what microbial species are out

there — and not on what they are doing together.

Dubinkina said she has worked with experimental data of microbial communities before, but her earlier work mainly focused on analyzing large volumes of data. This work takes it a step further by understanding the competition for nutrients taking place in microbial communities.

"In this project, we tried to think about how those microbes link to each other, how they're interacting," she said.

Maslov said descriptive science about microbial communities is common, but the challenge is using data to make predictive models that can help us scientists manipulate these communities to our advantage.

"Microbial communities greatly affect health and disease states in humans," Maslov said. "We also need to manipulate them for agricultural purposes because they affect the quality of the soil."

But the complexity of these communities — there are often hundreds of parameters — makes them difficult to model. Maslov said one of the advantages of their conceptual model is that it requires far fewer parameters.

"It's a much simpler set of information about the system, which gives you predictive powers," he said. "It tells you which species will survive, which nutrients they will use and how we can perturb the system . . . in such a way as to move it in the right direction." ■

Written by Emily Scott. Photo by Jillian Nickell.

MONTHLY PROFILE



Professor and Assistant Head of the Department of Comparative Biosciences, Indrani Bagchi and her lab study the mechanisms of implantation, uterine tumorigenesis, and endometriosis, exploring areas such as therapeutics for treating reproductive disease and novel contraceptives.

Indrani Bagchi: Using basic biology to improve reproductive health

Indrani Bagchi remembers the moment she realized her passion.

She had just started working as a new faculty member at the Population Council, a nonprofit organization that researches reproductive health. She was in a library, reading an article about the inception of pregnancy — an intricately balanced process that requires precise developmental timing and synchronization.

“I thought it was incredibly fascinating,” she said. “The female hormones in the body are the molecular triggers that make the uterus ready at a precise time so that when an embryo arrives, it is able to attach to the uterus and begin a pregnancy. I thought that it would be worth my efforts to study the mechanisms that control this fundamental process that creates life.”

Over the past 25 years, Bagchi’s research has been dedicated to studying the interactions between embryonic cells and maternal tissue. She is now the Billie Field Professor and Assistant Head of the Department of Comparative Biosciences and a member of IGB’s Computing Genomes for Reproductive Health (CGRH) theme.

Her research has led to an increased understanding of the hormone-dependent factors that control pregnancy and their dysfunctions that lead to pregnancy failure and infertility.

The key in establishing pregnancy is that both the embryo and the uterus have to be developed and ready at the same time — but exactly how the uterus prepares itself to be “receptive” to the embryo has not been well understood.

Bagchi’s work has uncovered specific factors that are present in the maternal cells that communicate to the embryo that it can implant and establish pregnancy.

“That aspect still fascinates me, how this embryo-uterine dialogue occurs that affects both the mother and the fetus,” she said.

Recently, Bagchi’s research has extended to understanding the importance of the placenta, an organ that nourishes the fetus and regulates fetal health.

She and her colleagues in CGRH are using genetically-engineered mouse models to analyze these interactions. They hope to further investigate how the epigenome, a group of dynamic

*“I thought that it would
be worth my efforts
to study the mechanisms
that control this fundamental
process that creates life.”*

chemical signatures on the chromatin, can alter the function of the genome and affect both the placenta and the fetus.

They are currently studying how pregnant women are affected by certain exposures, such as a high fat diet or environmental toxicants. Early results suggests these can impact the proper development and function of the placenta, which can ultimately affect the health of the fetus — and play a role in adult onset of various diseases.

“We are just beginning to learn the impact of the epigenome on fetal health,” she said. “That’s something I’d like to study more in the future.”

Her research on the basic biology of reproduc-

tive health fueled her interest in contraceptive research. In particular, Bagchi is interested in improving contraceptive research so that women can have more contraceptive choices.

In a collaboration with the Population Council, she was involved in the development of ellaOne, an emergency contraceptive that is now on the market.

She is also interested in improving intrauterine devices, or IUDs, a type of birth control. IUDs are effective and inexpensive, and they are commonly used in developing countries — but they often cause excess bleeding. Bagchi is currently working on developing an IUD that prevents this bleeding while still being fully effective in preventing pregnancy. She hopes the product will eventually enter the market and benefit women in developing countries.

Her research has always had two sides — one being understanding the basic biology of reproductive health, and the other being the application of this knowledge to create more reproductive choices for women.

“We would not have been able to make steady progress in women’s health without continuously improving our knowledge of the basic biology of the reproductive system,” she said. “I think that laid the foundation and helped the advancement of the contraceptive research.”

Bagchi said she appreciates the gratification that comes with knowing her work has helped women throughout the world — but she also enjoys going back to the basics.

“Every time I step into the lab and observe something exciting under the microscope, then I feel that it’s all worth it.” ■

Written by Emily Scott. Photo by L. Brian Stauffer

ON THE GRID HAPPENINGS AT THE IGB

NEW ARRIVALS



MARK HAUBER

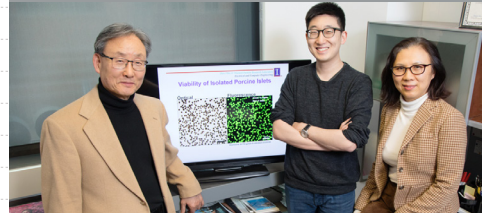
Professor Mark Hauber has joined the IGB as an affiliate member in the Gene Networks in Neural and Developmental Plasticity (GNDP) Research Theme. He recently joined the Department of Animal Biology as the Harley Jones Van Cleave Professor of Host-Parasite Interactions. Previously he served as associate provost for research at Hunter College, and as associate vice chancellor for research at the City University of New York. Professor Hauber's research focuses on the evolution of recognition systems, and using land and seabirds to address questions about how individuals recognize themselves, their mates, their young, their prey and their predators.



SHANNON SIRK

Professor Shannon Sirk has joined the IGB as an affiliate member in the Microbiome Metabolic Engineering (MME) Research Theme. She recently joined the Department of Bioengineering as an Assistant Professor. Professor Sirk received her Ph.D. from UCLA, and subsequently was a postdoctoral research associate at the Scripps Research Institute and Stanford University. Her research aims to harness the natural power of microbes to develop biological therapeutics that can treat cancer and other diseases.

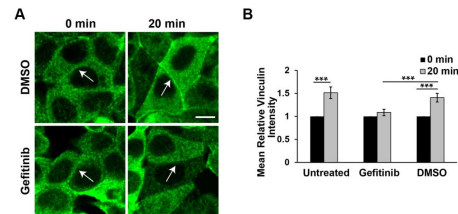
STUDY



DRUG-DELIVERING CAPSULES

Illinois electrical and computer engineering professor Kyekyoon "Kevin" Kim (RBTE, left) with graduate student Benjamin Lew (middle) and research scientist Hyungsoo Choi (right) have developed a method to make it easier to transplant pancreatic insulin-secreting cells from pigs to treat type I diabetes. Full article at <https://news.illinois.edu/view/6367/611434>.

PAPER



JOURNAL OF CELL SCIENCE

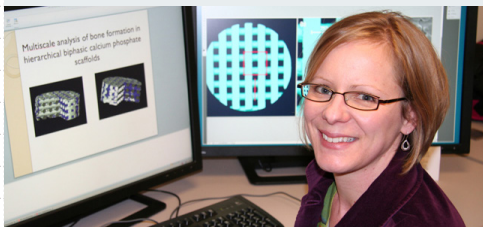
Reid T. Milner Professor of Chemical and Biomolecular Engineering Deborah Leckband (RBTE) and colleagues recently published a paper in Journal of Cell Science showing that EGFR is critical for force transduction and cytoskeletal remodeling at cadherin mediated cell-cell adhesions. E-cadherin interactions with EGFR suppresses EGFR signaling, but these results show the force on cadherins overrides the inhibition to activate EGFR. The paper shows that the EGFR signals regulate the mechanical reinforcement of intercellular adhesion by actin remodeling. Publication available at <http://jcs.biologists.org/content/early/2018/02/14/jcs.206656>.

AWARDS



BRENDAN HARLEY

Brendan Harley, Associate Professor, Chemical & Biomolecular Engineering (RBTE Theme Leader) was awarded the COE Dean's Award for Excellence in Research, and the LAS Dean's Award for Excellence in Undergraduate Teaching.



AMY. J. WAGONER JOHNSON

Amy J. Wagoner Johnson, Associate Professor, Mechanical Science and Engineering (CGRH/RBTE), received the 2018 College of Engineering Dean's Award for Excellence in Research in recognition of outstanding research.

ON THE GRID HAPPENINGS AT THE IGB

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/>.

EXHIBIT



ART OF SCIENCE 8.0

The IGB's Art of Science program is a celebration of common ground between science and art. Each exhibit comprises images from IGB's research portfolio enhanced to highlight the beauty and fascination encountered daily in scientific endeavors, from the microscopic to the holistic, from the physical to the abstract.

Join us for the opening reception on April 12, starting at 6:00PM, in our new location at Broadway Food Hall at 401 N. Broadway Avenue in Urbana. <http://bit.ly/2tCc5nh>.

DEPARTMENT ANNOUNCEMENTS

BUSINESS

ON-LINE W2 & 1042-S AVAILABLE NOW

If you have consented to receive your form W-2 and /or 1042-S electronically, it is now available. Below are the instructions to retrieve your form.

Access to Electronic Form W-2/1042-S/1095-C for Active Employees

To access the form employees should follow these steps:

1. Go to the [System HR website](#).
2. Select the Pay tab.
3. Click the link W-2/1042-S/1095-C Tax Statement.
4. Click the Access Tax Forms green button.
5. Log in using your NetID and Password.

6. Enter your Personal Identification Number (PIN) or create one.
7. Click Submit.
8. Click Continue.
9. Once on the W-2/1042-S/1095-C Tax Statement Consent Forms page, Click Continue.
10. Click on the link for the 2017 form you want to retrieve.
11. Your Form W-2/1042-S/1095-C will display on the screen.

If you have any questions you may contact University Payroll & Benefits Customer Service by phone at 217-265-6363 or email payinq@uillinois.edu. ■

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.

Harwood, S. A., Mendenhall, R., Lee, S. S., Riopelle, C., & Hunt, M. B. (2018). Everyday Racism in Integrated Spaces: Mapping the Experiences of Students of Color at a Diversifying Predominantly White Institution. *Annals of the American Association of Geographers*, 1-15. DOI: 10.1080/24694452.2017.1419122

Somavat, P., Kumar, D., & Singh, V. (2018). Techno-economic feasibility analysis of blue and purple corn processing for anthocyanin extraction and ethanol production using modified dry grind process. *Industrial Crops and Products*, 115, 78-87. DOI: 10.1016/j.indcrop.2018.02.015

Lu, L., Yang, Z., Meacham, K., Cvetkovic, C., Corbin, E. A., Vázquez-Guardado, A., ... Rogers, J. A. (2018). Biodegradable Monocrystalline Silicon Photovoltaic Microcells as Power Supplies for Transient Biomedical Implants. *Advanced Energy Materials*. DOI: 10.1002/aenm.201703035

Westbrook, S. R., Hankosky, E. R., Dwyer, M. R., & Gulley, J. M. (2018). Age and Sex Differences in Behavioral Flexibility, Sensitivity to Reward Value, and Risky Decision-Making. *Behavioral Neuroscience*. DOI: 10.1037/bne0000235

Park, J., Kim, J., Sullivan, K. M., Baik, S., Ko, E., Kim, M. J., ... Kong, H. (2018). Decellularized Matrix Produced by Mesenchymal Stem Cells Modulates Growth and Metabolic Activity of Hepatic Cell Cluster. *ACS Biomaterials Science and Engineering*, 4(2), 456-462. DOI: 10.1021/acs-biomaterials.7b00494

Lane, S., Xu, H., Oh, E. J., Kim, H., Lesmana, A., Jeong, D., ... Kim, S. R. (2018). Glucose repression can be alleviated by reducing glucose phosphorylation rate in *Saccharomyces cerevisiae*. *Scientific Reports*, 8(1), [2613]. DOI: 10.1038/s41598-018-20804-4

Beerling, D. J., Leake, J. R., Long, S. P., Scholes, J. D., Ton, J., Nelson, P. N., ... Hansen, J. (2018). Farming with crops and rocks to address global climate, food and soil security. *Nature Plants*, 1-10. DOI: 10.1038/s41477-018-0108-y

Bothwell, M. Y., & Gillette, M. U. (2018). Circadian redox rhythms in the regulation of neuronal excitability. *Free Radical Biology and Medicine*. DOI: 10.1016/j.freeradbiomed.2018.01.025

Ossler, J. N., & Heath, K. D. (2018). Shared genes but not shared genetic variation: Legume colonization by two belowground symbionts. *American Naturalist*, 191(3), 395-406. DOI: 10.1086/695829

Mapes, J., Anandan, L., Li, Q., Neff, A., Clevenger, C. V., Bagchi, I. C., & Bagchi, M. K. (2018). Aberrantly high expression of the CUB and zona pellucida-like domain-containing protein 1 (CUZD1) in mammary epithelium leads to breast tumorigenesis. *Journal of Biological Chemistry*, 293(8), 2850-2864. DOI: 10.1074/jbc.RA117.000162

Wolz, K. J., Lovell, S. T., Branham, B. E., Eddy, W. C., Keeley, K., Revord, R. S., ... DeLucia, E. H. (2018). Frontiers in alley cropping: Transformative solutions for temperate agriculture. *Global Change Biology*, 24(3), 883-894. DOI: 10.1111/gcb.13986

Wang, R., Xu, Y., Sors, T., Irudayaraj, J., Ren, W., & Wang, R. (2018). Impedimetric detection of bacteria by using a microfluidic chip and silver nanoparticle based signal enhancement. *Microchimica Acta*, 185(3), [184]. DOI: 10.1007/s00604-017-2645-x

Abueidda, D. W., Jasiuk, I., & Sobh, N. A. (2018). Acoustic band gaps and elastic stiffness of PMMA cellular solids based on triply periodic minimal surfaces. *Materials and Design*, 145, 20-27. DOI: 10.1016/j.matdes.2018.02.032

Munson-McGee, J. H., Peng, S., Dewerff, S., Stepanauskas, R., Whitaker, R. J., Weitz, J. S., & Young, M. J. (2018). A virus or more in (nearly) every cell: ubiquitous networks of virus-host interactions in extreme environments. *ISME Journal*, 1-9. DOI: 10.1038/s41396-018-0071-7

Kumar, P., Liu, J., Ranjan, P., Hu, Y., Yamijala, S. S., Pati, S. K., ... Cheng, G. J. (2018). Alpha Lead Oxide (α -PbO): A New 2D Material with Visible Light Sensitivity. *Small*. DOI: 10.1002/sml.201703346

Yeoman, C. J., Ishaq, S. L., Bichi, E., Olivo, S. K., Lowe, J., & Aldridge, B. M. (2018). Biogeographical Differences in the Influence of Maternal Microbial Sources on the Early Successional Development of the Bovine Neonatal Gastrointestinal tract. *Scientific Reports*, 8(1), [3197]. DOI: 10.1038/s41598-018-21440-8

Feinberg, A. M., Hernandez, H. L., Plantz, C. L., Mejia, E. B., Sottos, N. R., White, S. R., & Moore, J. S. (2018). Cyclic Poly(phthalaldehyde): Thermoforming a Bulk Transient Material. *ACS Macro Letters*, 7(1), 47-52. DOI: 10.1021/acsmacrolett.7b00769

Kannan, A., Bhurke, A., Sitruk-Ware, R., Lalitkumar, P. G., Gemzell-Danielsson, K., Williams, A. R. W., ... Bagchi, I. C. (2018). Characterization of Molecular Changes in Endometrium Associated With Chronic Use of Progesterone Receptor Modulators: Ulipristal Acetate Versus Mifepristone. *Reproductive Sciences*, 25(3), 320-328. DOI: 10.1177/1933719117746764

Meng, Z., Hu, X., Zhang, Z., Li, Z., Lin, Q., Yang, M., ... Wang, K. (2018). Chromosome Nomenclature and Cytological Characterization of Sacred Lotus. *Cytogenetic and Genome Research*. DOI: 10.1159/000486777

Della Ripa, L. A., Petros, Z. A., Cioffi, A. G., Piehl, D. W., Courtney, J. M., Burke, M. D., & Rienstra, C. M. (2018). Solid-State NMR of highly ^{13}C -enriched cholesterol in lipid bilayers. *Methods*. DOI: 10.1016/j.ymeth.2018.01.008

Anapindi, K. D. B., Romanova, E. V., Southey, B. R., & Sweedler, J. V. (2018). Peptide identifications and false discovery rates using different mass spectrometry platforms. *Talanta*, 182, 456-463. DOI: 10.1016/j.talanta.2018.01.062

Gernat, T., Rao, V. D., Middendorf, M., Dankowicz, H., Goldenfeld, N., & Robinson, G. E. (2018). Automated monitoring of behavior reveals bursty interaction patterns and rapid spreading dynamics in honey-bee social networks. *Proceedings of the National Academy of Sciences of the United States of America*, 115(7), 1433-1438. DOI: 10.1073/pnas.1713568115

Bhandari, P., Novikova, G., Goergen, C. J., & Irudayaraj, J. (2018). Ultrasound beam steering of oxygen nanobubbles for enhanced bladder cancer therapy. *Scientific Reports*, 8(1), [3112]. DOI: 10.1038/s41598-018-20363-8

ILLINOIS

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