

IGB NEWS

Upcoming Events
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Image Of The Month
Research News
Department Announcements

Volume 11 Number 7

UPCOMING EVENTS

IGB Seminar (MME)

Antibiotics Secreted by Gut Bacteria Regulate Clostridium difficile growth and the Structure of the Gut Microbiome: Role of Secondary Bile Acids

November 11, 2018, 12:00 p.m.
612 Carl R. Woese Institute for Genomic Biology

Phil Hylemon, PhD
Virginia Commonwealth University
School of Medicine

IGB Pioneers Seminar (GNDP)

Playing with life: Humans and the Future of the Biosphere

November 27, 2018, 12:00 p.m.
612 Carl R. Woese Institute for Genomic Biology

Henry T. Greely, PhD
Stanford Law School, Director
Center for Law and the Biosciences

IGB Seminar

Risk Communication Practice at CDC: From Ebola to Zika

December 4, 2018, 12:00 p.m.
612 Carl R. Woese Institute for Genomic Biology

Katherine Lyon Daniel, PhD
Associate Director for Communication, Centers
for Disease Control and Prevention (CDC)

Lunch with the Core

Genetics of the Diarrheal Pathogen Cryptosporidium Parvum: Illuminating Parasite Biology and Validating Drug Targets

December 5, 2018, 12:00 p.m.
612 Carl R. Woese Institute for Genomic Biology

Sumiti Vinayak, PhD
Department of Pathobiology

FEATURED NEWS



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May Berenbaum Named
PNAS Editor-in-Chief



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Stem cell proliferation controlled
directly by nervous system



4

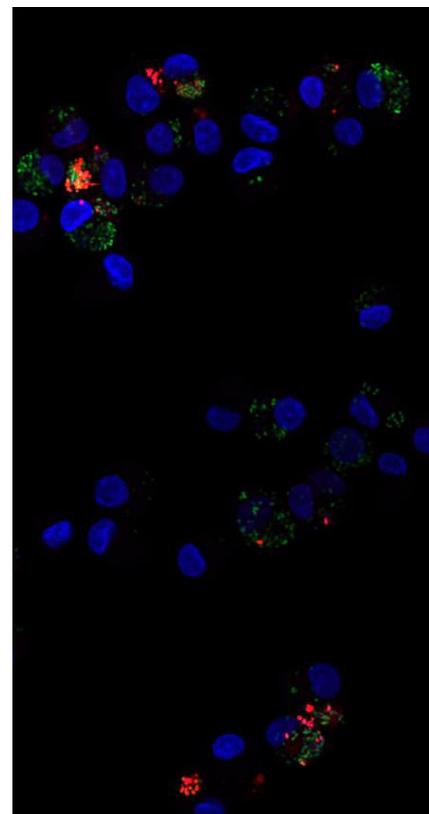
Monthly Profile:
Caitlin Moore



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On the Grid:
Happenings at IGB

IMAGE OF THE MONTH



This month features human macrophages infected with *Yersinia pestis* Kim 5 (plague) 10:1 after 24 hours. Here DNA is blue, *Y. pestis* is green and bacterial death is marked in red. Prepared and visualized by Katie Van Etten (Anthropology, 2017) as part of the Brinkworth Evolutionary Immunology and Genomic lab's research into the evolution of human immune function, imaged with a Zeiss LSM 700 four laser scanning confocal microscope.

IGB News

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



May Berenbaum Named PNAS Editor-in-Chief

University of Illinois entomology professor and department head May Berenbaum, a member of the National Academy of Sciences and longtime editorial contributor to the *Proceedings of the National Academy of Sciences* and other journals, has been appointed editor-in-chief of PNAS, effective Jan. 1.

PNAS is among the most influential scientific journals in the world. It publishes original research reports, commentaries, perspectives, colloquium papers and actions of the Academy. Coverage in PNAS spans the biological, physical and social sciences.

Berenbaum holds the Swanlund Chair of Entomology Illinois and is a member of the IGB's Genomic Ecology of Global Change and Infection Genomics for One Health research themes. She was elected to the National Academy of Sciences in 1994 and has served on the PNAS editorial board since 1998.

"The National Academy is so fortunate to have recruited a new editor-in-chief with the international reputation, leadership experience and excellence, and commitment to quality communication demonstrated by Professor Berenbaum," said National Academy of Sciences president Marcia McNutt in a statement announcing the appointment. "Her dedication to the journal and to the academy is legendary. I look forward to working with her in the coming years."

Berenbaum graduated summa cum laude with a bachelor's degree in biology from Yale University in 1975 and a Ph.D. degree in ecology and evolutionary biology from Cornell University in 1980.

She is the recipient of numerous scientific honors, including memberships in the NAS, the American Academy of Arts and Sciences, and the American Philosophical Society. She is a recipient of the

"It's an amazing opportunity to help PNAS continue to influence the path and progress of science as it kicks off its second century."

2014 National Medal of Science and in 2011 received the Tyler Prize in Environmental Achievement.

"What I like most about PNAS, and what sets it apart from its pre-eminent peers, is its breadth," Berenbaum said. "Its structure is built on the breadth of the NAS itself, encompassing the natural, physical and social sciences, and spanning basic and applied dimensions. It's an amazing opportunity to help PNAS continue to influence the path and progress of science as it kicks off its second century."

"May is one of the university's most accomplished scholars, and we are thrilled to hear that she will serve in such a prominent role," said Susan Martinis, the vice chancellor for research at Illinois. "Indeed, I believe that she is the first editor-in-chief to be named from a Midwest land-grant public institution – one of her many firsts in breaking new ground."

"This is an extraordinary honor that positions May to be among the leaders in influencing the shape of scientific communication and its impact on society," said U. of I. entomology professor Gene Robinson, the director of the Carl R. Woese Institute for Genomic Biology and a member of NAS. "We know May will use her enormous talents to keep PNAS at the leading edge of reporting great science and transformative discoveries in the uniquely diverse set of disciplines covered by this prestigious journal." ■

Written by Diana Yates. Photo by Kathryn Faith.



PNAS is one of the world's most-cited and comprehensive multidisciplinary scientific journals, publishing more than 3,200 research papers annually.

Established in 1914, PNAS publishes cutting-edge research, science news, Commentaries, Perspectives, Colloquium Papers, Reviews, and actions of the NAS.



Stem cell proliferation controlled directly by nervous system

Somatic stem cells are microscopic workhorses, constantly regenerating cells throughout the body: skin and the lining of the intestine, for example. And to University of Illinois neuroscientists, they represent untapped potential.

“If we could find a way to target and control stem cell proliferation in the body, there could be potential medical benefits, including turning off the proliferation of cancer stem cells or inducing proliferation of somatic stem cells where we want to grow tissue,” says Elizabeth Davis (above, right), doctoral researcher in the Neuroscience Program at Illinois and lead author of a study that demonstrates, for the first time, that stem cell proliferation is directly controlled by the autonomic nervous system (ANS).

The ANS controls all of our unconscious functions: breathing, blood flow, digestion, and so forth. Its two major networks of nerve fibers run from the brain through the entire body, with neurons reaching into nearly every organ. These neurons release chemicals called neurotransmitters, which can affect target cells directly or indirectly.

When neurotransmitters bind to receptors in the membranes of certain cells, they elicit a direct response within the cell. But changes in cells can also occur when neurotransmitters induce a general state of inflammation or alter blood flow, an indirect route of action for the ANS.

Prior to Davis’s study, which is published in *Physiological Reports*, scientists had suspected the ANS was involved in stem cell proliferation, but they didn’t know if the relationship was direct or indirect. A direct relationship could have greater im-

plications for drug interventions to treat medical conditions.

“If you wanted to change the regeneration potential of an organ, for example, you wouldn’t have to stimulate or suppress the activity of those neurons. Instead, you could just figure out what neurotransmitters are controlling proliferation and then get that chemical to those stem cells with targeted drug delivery,” says Megan Dailey (above, left), assistant professor in the Department of Animal Sciences and co-author on the paper, who is a member of the IGB’s Regenerative Biology & Tissue Engineering research theme.

To characterize the relationship, the researchers focused on stem cells in the intestinal lining, or epithelium, in mice. They found not only that the stem cells did have receptors for ANS neurotransmitters, but also the neurotransmitters changed the behavior of the cells – just what they would expect to see for a direct relationship.

“We knew that nerves of the ANS came into close contact with cells of the intestinal epithelium, including stem cells, but we didn’t know if the neurotransmitters were able to bind to the stem cells. When we isolated the stem cells and found there were actually ANS neurotransmitter receptors, we found that missing piece,” Davis says.

To demonstrate that stem cell behavior was changing as a result of ANS stimulation, the researchers grew intestinal epithelial cells in the lab and exposed them to high levels of two neurotransmitters, norepinephrine and acetylcholine. Norepinephrine is a major neurotransmitter of the sympathetic nervous system, or “fight or flight” branch of the

ANS, while acetylcholine is produced by the parasympathetic nervous system, or “rest and digest” branch.

“When we simulated activation of either of those systems, we saw a decrease in stem cell proliferation,” Dailey says.

She suggests the body may avoid putting energy into making new cells when the fight or flight system is active. Instead, she reasons, that energy is needed to make a quick getaway. Peak moments of rest and digest may not be the best for making new cells, either, because when food is coming in, cellular processes related to digestion can create free radicals that can damage new cells.

Although the research focused on the intestinal epithelium, Davis and Dailey suspect the ANS is directly controlling stem cell proliferation in other parts of the body, as well. In fact, they recently published another paper, published in the *American Journal of Physiology*, making the case for the broader phenomenon using multiple clues from other studies.

“The ANS isn’t controlled by itself – it’s controlled by the brain and the central nervous system. We think the brain is controlling the regeneration of all these tissues through the ANS. But that brings up a bigger picture. For individuals under severe depression or PTSD, for example, you see degeneration of some of their organs. It could be some sort of stress-related effect through the ANS decreasing the regenerative potential of the organs. Based on our findings, it looks like there could be a direct effect,” said Davis. ■

Written by Lauren Quinn. Photo by Lauren Quinn.

MONTHLY PROFILE



Caitlin Moore is a postdoctoral researcher at the University of Illinois, interested in how plants function and interact with their environments from the leaf to ecosystem to global scale.

A love for nature Caitlin Moore follows new ideas in plant physiology

Dr. Caitlin Moore loves spending time outdoors. Though most of her hours spent in nature involve analyzing plant interactions, taking measurements, and fixing equipment, it's still exactly where she wants to be.

"Most of my work is done outside," she said. "I think that's the key reason I've really enjoyed this line of work."

Moore is a postdoctoral researcher in the lab of Carl Bernacchi, a USDA-ARS scientist, associate professor in the Department of Plant Biology and an affiliate of IGB's GEGC theme.

At the IGB, Moore has contributed to a number of research projects, including RIPE, WEST, and most recently, CABBI.

She earned her doctorate from Monash University in Australia, where she studied environmental science and natural ecosystems through her research on the carbon balance of a tropical savanna.

"I really enjoyed my PhD work and I learned a lot about natural ecosystems," she said. "But I'm also from a farming background, and so I wanted to use my science to help farming communities."

When Moore heard about the postdoctoral position at the IGB, she thought it was a perfect fit.

She first became involved with the WEST project, which involves increasing the water use efficiency of sorghum so it can be grown on marginalized land. Her job was to look at how using less water could affect the surface temperature of plant canopies.

"If the plants are evaporating less water and losing heat through that water evaporation, the surface is likely to get hotter," she said.

Her skills in micrometeorology — looking at how weather and climate affect fields, rather than regions

— led her to become involved in CABBI, a collaboration between the IGB and the Institute for Sustainability, Energy, and Environment.

CABBI's goal is to develop economically and ecologically sustainable biofuel products. Moore is a

"Some of the best scientific work has been achieved through collaborations, which I think comes from sharing ideas and experiences"

member of the Sustainability theme, which will provide an environmental and economic perspective of CABBI's work.

Moore's work with CABBI revolves around a set of flux towers in crop fields. These towers have sensors that can measure how carbon dioxide and water are exchanged between the plants and the atmosphere. Her skills in micrometeorology are useful in this project, where she analyzes these interactions at the field scale.

She also studies plant-atmosphere interactions as a part of a collaboration with Dr. Katherine Meacham-Hensold from the RIPE project, which is engineering plants to be sustainable and increase food productivity.

Her many collaborations both shape and inspire her work.

"I like to collaborate and be involved in as much as I can," she said. "There's a lot of really cool activities going on here about using technology . . . I like being exposed to that."

She said collaborating with others has given her a sense of interconnectedness and helped her develop wider networks.

"Some of the best scientific work has been achieved through collaborations, which I think comes from sharing ideas and experiences," she said.

Moore hopes to pursue a career in academia and continue following new ideas.

"Coming here, while it was a steep learning curve, it's really opened my eyes up to a whole new realm of science," she said. "That's what I like about science, is that you never know where the next idea might take you."

Written by Emily Scott. Photo by Jordan Goebig.



CABBI is dedicated to solving the issue of providing sustainable sources of energy that meet societal needs as the population continues to grow, developing efficient ways to grow, transform, and market biofuels and other bioproducts, using genomics, synthetic biology, and computational biology to increase the value of biomass crops.

ON THE GRID HAPPENINGS AT THE IGB

AWARD



GENE ROBINSON

Entomology professor and director of the IGB Gene Robinson, an international leader in honey bee research, has been elected to the National Academy of Medicine “for pioneering contributions to understanding the roles of genes in social behavior.”

Election to the NAM is considered one of the highest honors in the fields of health and medicine and recognizes individuals who have demonstrated outstanding professional achievement and commitment to service.

“It is unusual for a scientist to be recognized for contributions both to agriculture and medicine, but Robinson’s work with honey bees has real relevance to our understanding of the brain and behavior,” said Robert Jones, the chancellor of the Urbana-Champaign campus. “Thanks to Robinson’s work, we now have a better understanding of honey bee behavior and its genetic underpinnings – and we see compelling parallels to human brain plasticity and function.”

OUTREACH



GAMEDAY GENOMICS

Come visit the IGB’s Gameday Genomics booth in Grange Grove before any Fighting Illini home game, to try our science-themed tailgating games, do some hands-on science activities, and take “cellfies” at our photo booth with science props and giant heads!

GENOME

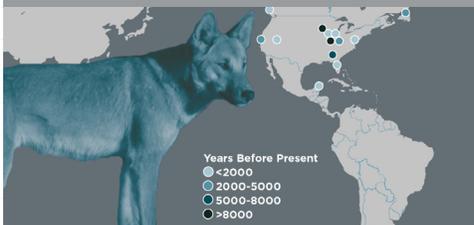


RESEARCHERS UNLOCK MYSTERIES OF SUGARCANE GENOME

Researchers have extracted the massive and complex genome sequence of sugarcane, which may lead to the development of hardier and more productive cultivars.

Producing the comprehensive sequence required a concerted effort by over 100 scientists from 16 institutions; the work took five years and culminated in a publication in Nature Genetics. Plant biology professor Ray Ming (GEGC) instigated and led the sequencing effort. Read the full story [here](#).

CANINE DNA



NATIONAL SOCIETY OF BLACK ENGINEERS

A new comprehensive genomic study of ancient dogs in the Americas to analyze nuclear DNA (inherited from both parents, along with mitochondrial DNA), which is passed down only from mothers to their offspring. By comparing genomic signatures from 71 mitochondrial and seven nuclear genomes of ancient North American and Siberian dogs spanning a period of 9,000 years, the research team including Anthropology professor Ripan Malhi (CGRH/RBTE) was able to gain a clearer picture of the history of the first canine inhabitants of the Americas. Read the full story [here](#).

WORLD OF GENOMICS



WORLD OF GENOMICS A HIT AT ST. LOUIS SCIENCE CENTER

From October 18-20 the IGB brought our largest public engagement exhibit, the World of Genomics, to the Saint Louis Science Center. Our six learning stations featured a number of exciting and interactive learning opportunities, including crop-rovng robots, live sequencing, a beehive, virtual reality experiences, advanced microscopy, and much more.

Over 6500 attendees enjoyed the experience, including local students who were brought in for a special lecture, public school teachers joining for professional development, and Illinois alumni with St. Louis community members at our hosted Saturday morning reception with talks from notable IGB faculty.

TOUR



NATIONAL SOCIETY OF BLACK ENGINEERS

34 high school students from the National Society of Black Engineers (NSBE) visited the IGB as part of NSBE’s High School Visitation Program, which selects underrepresented high school students interested in majoring in STEM-related fields for a weekend on campus each year. Students interacted with a panel that included an undergraduate researcher, a graduate student, and a postdoc, spoke to researchers, toured our facilities, and learned more about the research being done here at IGB.

DEPARTMENT ANNOUNCEMENTS

FACILITIES AND SERVICES

IGB HOLIDAY SCHEDULE & BUILDING INFORMATION

Thanksgiving Holiday: Thursday November 23, & Friday November 24
Christmas & New Year's Day Holiday: December 25 - January 1

- The IGB building will be closed. This includes administrative offices, purchasing, shipping and receiving, and Array Cafe.
- All exterior doors will be locked, and all card access doors require entry with a valid IGB prox card.
- Check your i-Card expiration date. Access will automatically be deactivated if your i-Card expires on or before December 31, 2017. You must renew your i-Card at the i-Card Center prior to December 20.
- Do not place orders for packages that may be scheduled for delivery December 25-January 1. No packages or mail will be received or sent during this time by IGB Shipping and Receiving. Please contact receiving@igb.illinois.edu for questions related to shipping, receiving, or mail. Questions related to purchasing should be directed to the IGB Business Office at purchasing@igb.illinois.edu.
- Take extra care when entering the IGB both via the exterior doors during off-hours and doors leading into secured spaces within the IGB at any time.
- Do not let unknown people into the IGB or secured spaces. Anyone needing access should be directed to Operations and Facilities for prox card or key access permissions.
- Be aware of people loitering around the doors and grabbing the door before it closes behind you to gain access.
- Absolutely NO doors should be propped open to compromise IGB security.
- Be observant of your surroundings and report any suspicious behavior immediately by calling 911 from a campus phone.
- Turn off all lights when you leave your area.
- If you notice any urgent building issues (water leaks, CT room temperature problems, etc.) please call the Public Safety Dispatch Office at 217-333-0340 for off-hours assistance. During holiday break, emails sent to facilities@igb.illinois.edu will not be immediately addressed.
- "No parking" and permit only parking areas are still enforced. IGB bagged meters on Mathews and IGB dock parking spaces are available by permit only. Ticketing/towing may occur at vehicle owner's expense if parked in non-assigned space without permit.
- Be aware of the potential for ice forming on streets, sidewalks, and parking lots across campus. Using customary winter caution is the most important means of protection against injury. Look at the walkway in front of you frequently or continuously when you suspect there could be slick spots. To report persistent areas of ice accumulation, please contact the Service Office at 217-333-0340.
- The University of Illinois Public Safety website has helpful information regarding personal safety, as well as other topics of interest. <http://www.dps.uiuc.edu/universitypolice/campusafety.html> ■

BUSINESS

HOLIDAY BREAK REDUCED SERVICE DAYS

As we approach the holiday season we are providing a reminder of the upcoming holiday schedule and the accompanying gift days.

Monday, December 24, 2018

½ Gift Day (from President & Chancellor) and ½ Excused Day p.m

Tuesday, December 25, 2018

Christmas Day Holiday

Wednesday, December 26, 2018

Day After Christmas Holiday (Designated Holiday)

Thursday, December 27, 2018

Gift Day**

Friday, December 28, 2018

Gift Day**

Monday, December 31, 2018

Gift Day**

Monday, January 1, 2019

New Year's Day Holiday Observed

Reduced Service Days:

As in the past, IGB will be closed starting December 24, 2018, thru January 1, 2019, and most employees will not be working those three days. Please note the three gift days must be used December 27th, 28th, and 31st; they cannot be "saved" to use at another point in time.

Questions regarding reduced service days, please contact Jacinda King at 244-2276 or jkking@illinois.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.

Cronan, J. E. (2018). Advances in synthesis of biotin and assembly of lipoic acid. *Current Opinion in Chemical Biology*, 47, 60-66. DOI: 10.1016/j.cbpa.2018.08.004

Bakir, M., Meyer, J. L., Sutrisno, A., Economy, J., & Jasiuk, I. (2018). Aromatic thermosetting copolyester bionanocomposites as reconfigurable bone substitute materials: Interfacial interactions between reinforcement particles and polymer network. *Scientific Reports*, 8(1), [14869]. DOI: 10.1038/s41598-018-33131-5

Zallot, R., Oberg, N. O., & Gerlt, J. A. (2018). 'Democratized' genomic enzymology web tools for functional assignment. *Current Opinion in Chemical Biology*, 47, 77-85. DOI: 10.1016/j.cbpa.2018.09.009

RECENT PUBLICATIONS

- Sivaguru, M., Saw, J. J., Williams, J. C., Lieske, J. C., Krambeck, A. E., Romero, M. F., ... Fouke, B. W. (2018). Geobiology reveals how human kidney stones dissolve *in vivo*. *Scientific Reports*, 8(1), [13731]. DOI: 10.1038/s41598-018-31890-9
- Xu, H., Yu, Q., Shi, Y., Hua, X., Tang, H., Yang, L., ... Zhang, J. (2018). PGD: Pineapple Genomics Database. *Horticulture Research*, 5(1), [66]. DOI: 10.1038/s41438-018-0078-2
- Allender, M. C., Baker, S., Britton, M., & Kent, A. D. (2018). Snake fungal disease alters skin bacterial and fungal diversity in an endangered rattlesnake. *Scientific Reports*, 8(1), [12147]. DOI: 10.1038/s41598-018-30709-x
- Mand, T. D., Kulkarni, G., & Metcalf, W. W. (2018). Genetic, Biochemical, and Molecular Characterization of *Methanosarcina barkeri* Mutants Lacking Three Distinct Classes of Hydrogenase. *Journal of bacteriology*, 200(20). DOI: 10.1128/JB.00342-18
- Yu, Z., Zhou, W., Ma, G., Li, Y., Fan, L., Li, X., & Lu, Y. (2018). Insights into the Competition between K⁺ and Pb²⁺ Binding to a G-Quadruplex and Discovery of a Novel K⁺-Pb²⁺-Quadruplex Intermediate. *Journal of Physical Chemistry B*, 122(40), 9382-9388. DOI: 10.1021/acs.jpcc.8b08161
- Wang, X., Pipes, L., Trut, L. N., Herbeck, Y., Vladimirova, A. V., Gulevich, R. G., ... Clark, A. G. (2018). Genomic responses to selection for tame/aggressive behaviors in the silver fox (*Vulpes vulpes*). *Proceedings of the National Academy of Sciences of the United States of America*, 115(41), 10398-10403. DOI: 10.1073/pnas.1800889115
- Yuan, J., Hu, Z., Mahal, B. A., Zhao, S. D., Kensler, K. H., Pi, J., ... Zhang, L. (2018). Integrated Analysis of Genetic Ancestry and Genomic Alterations across Cancers. *Cancer Cell*, 34(4), 549-560.e9. DOI: 10.1016/j.ccell.2018.08.019
- Song, Z., Fu, H., Wang, R., Pacheco, L. A., Wang, X., Lin, Y., & Cheng, J. (2018). Secondary structures in synthetic polypeptides from N-carboxyanhydrides: design, modulation, association, and material applications. *Chemical Society Reviews*, 47(19), 7401-7425. DOI: 10.1039/c8cs00095f
- Neumann, E. K., Comi, T. J., Spegazzini, N., Mitchell, J. W., Rubakhin, S. S., Gillette, M. U., ... Sweedler, J. V. (2018). Multimodal Chemical Analysis of the Brain by High Mass Resolution Mass Spectrometry and Infrared Spectroscopic Imaging. *Analytical chemistry*, 90(19), 11572-11580. DOI: 10.1021/acs.analchem.8b02913
- Talukdar, T., Nikolaidis, A., Zwilling, C. E., Paul, E. J., Hillman, C. H., Cohen, N. J., ... Barbey, A. K. (2018). Aerobic fitness explains individual differences in the functional brain connectome of healthy young adults. *Cerebral Cortex*, 28(10), 3600-3609. DOI: 10.1093/cercor/bhx232
- Bi, X., & Qu, A. (2018). A mixed-effects estimating equation approach to nonignorable missing longitudinal data with Refreshment samples. *Statistica Sinica*, 28(4), 1653-1675. DOI: 10.5705/ss.202015.0317
- Raina, M., King, A., Bianco, C., & Vanderpool, C. K. (2018). Dual-function RNAs. *Microbiology Spectrum*, 6(5), [RWR-0032-2018]. DOI: 10.1128/microbiolspec.RWR-0032-2018
- Osborne, C. C., Perry, K. J., Shankland, M., & Henry, J. Q. (2018). Ectomesoderm and epithelial-mesenchymal transition-related genes in spiralian development. *Developmental Dynamics*, 247(10), 1097-1120. DOI: 10.1002/dvdy.24667
- Xing, Y., Yu, Y., & Men, Y. (2018). Emerging investigators series: Occurrence and fate of emerging organic contaminants in wastewater treatment plants with an enhanced nitrification step. *Environmental Science: Water Research and Technology*, 4(10), 1412-1426. DOI: 10.1039/c8ew00278a
- Madden, G., Arnold, E. R., Karsten, J., & Ambrose, S. H. (2018). Evaluating competition and conflict among western Ukraine Neolithic farmers with stable isotope analyses of human teeth. *Journal of Archaeological Science: Reports*, 21, 897-903. DOI: 10.1016/j.jasrep.2018.08.031
- Calla, B., MacLean, M., Liao, L. H., Dhanjal, I., Tittiger, C., Blomquist, G. J., & Berenbaum, M. R. (2018). Functional characterization of CYP4G11—a highly conserved enzyme in the western honey bee *Apis mellifera*. *Insect Molecular Biology*, 27(5), 661-674. DOI: 10.1111/imb.12516
- Liu, M., Chowdhary, G., Castra Da Silva, B., Liu, S. Y., & How, J. P. (2018). Gaussian Processes for Learning and Control: A Tutorial with Examples. *IEEE Control Systems*, 38(5), 53-86. [8467518]. DOI: 10.1109/MCS.2018.2851010
- Kayacan, E., Young, S. N., Peschel, J. M., & Chowdhary, G. (2018). High-precision control of tracked field robots in the presence of unknown traction coefficients. *Journal of Field Robotics*, 35(7), 1050-1062. DOI: 10.1002/rob.21794
- Hays, I. R., & Hauber, M. E. (2018). How the egg rolls: A morphological analysis of avian egg shape in the context of displacement dynamics. *Journal of Experimental Biology*, 221(19), [jeb178988]. DOI: 10.1242/jeb.178988
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- Liem, D. A., Murali, S., Sigdel, D., Shi, Y., Wang, X., Shen, J., ... Han, J. (2018). Phrase mining of textual data to analyze extracellular matrix protein patterns across cardiovascular disease. *American Journal of Physiology - Heart and Circulatory Physiology*, 315(4), H910-H924. DOI: 10.1152/ajpheart.00175.2018
- An, L., Cogan, D. P., Navo, C. D., Jiménez-Osés, G., Nair, S. K., & van der Donk, W. A. (2018). Substrate-assisted enzymatic formation of lysinoalanine in duramycin. *Nature chemical biology*, 14(10), 928-933. DOI: 10.1038/s41589-018-0122-4 ■

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