

BU Scientists Attend Launch of National Microbiome Initiative

WHITE HOUSE ANNOUNCES FEDERAL, PRIVATE SECTOR COLLABORATION

Right now, armies of microbes are wiggling, slithering and swimming through your gut, over your tongue and across your skin. Your microbes can do things that are essential, like making vitamin K, or dysfunctional, like increasing your risk of obesity. The full set of microbes associated with a particular habitat is called a microbiome, and almost every habitat on earth—including your body—has one. Rivers have their own microbiomes, as do fish, oceans, patches of soil and even the earth's atmosphere.

In recent years, scientists and the public have come to appreciate these complicated communities of minute microbes, which may offer clues to curing diabetes and clearing oil spills and understanding a wide range of occurrences, from climate change to the origin of life.

On May 13, 2016, the White House Office of Science and Technology Policy took steps to recognize these tiny fellow-travelers by launching the National Microbiome Initiative. Several federal agencies will provide scientists with \$120 million in new research funding through the initiative, which also will receive \$400 million in new funding from nonfederal groups, such as industry, academia and private foundations.

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A group of interdisciplinary scientists at the forefront of microbiome research attended the launch event, including Boston University's Daniel Segrè, a College of Engineering professor of bioinformatics and of biomedical engineering

and a College of Arts & Sciences professor of biology, and Allyson Byrd (ENG'19), a PhD candidate in bioinformatics, who studies the human microbiome at the National Institutes of Health's National Human Genome Research Institute, as part of the BU-NIH graduate partnership program.

"What's happening here is really pushing all the boundaries. I've never seen something so ready to go," said Congresswoman Louise Slaughter (D-NY), during introductory remarks to scientists and policy makers at the White House event announcing the launch. Slaughter, a microbiologist by training, said that gaining a better understanding of the microbial world is critical for confronting issues like food safety and antibiotic resistance. "It's going to be like splitting the atom when you get all this done," she said.

During the event, Obama administration officials announced steps to address questions that span multiple microbiomes—like, what is a healthy microbiome? Why are some microbial communities resistant to change while others are vulnerable? Funding will target the need for better technology and more computing power to model microbial communities, and ultimately, tools to fix dysfunctional microbiomes and protect healthy ones.



Daniel Segrè, an ENG and CAS professor, and PhD candidate Allyson Byrd (ENG'19) were at the White House for the launch of the National Microbiome Initiative. "It's a very exciting time," says Segrè. "Now everybody is interested in the microbiome."

Funding for the initiative will come from the US Department of Energy, the National Aeronautics and Space Administration, the National Institutes of Health, the National Science Foundation and the US Department of Agriculture, as well as from nonfederal organizations, among them the Bill & Melinda Gates Foundation.

"There are many different angles to look at microbes, many people in different fields who don't even know each other, but are doing highly related work," says Segrè, who uses computer modeling to study the behavior of microbial communities. He says that BU has unique strengths in mathematical modeling, physics, environmental biology and biomedical engineering that can be brought to bear on understanding how microbes behave individually and on a global scale.

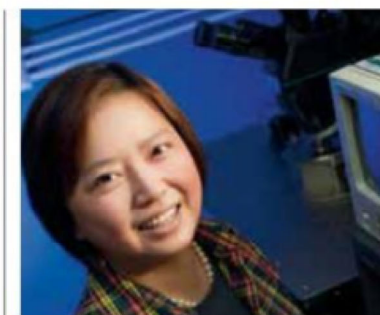
"The initiative has been very energizing and exciting," Segrè says. "I love the idea of people from different departments making new connections. That's how you get the most interesting science."

—BARBARA MORAN

PHOTOGRAPHY COURTESY OF DANIEL SEGRÈ

Zhang Receives Technical Achievement Award

RECOGNIZED BY IEEE SENSORS COUNCIL FOR MEMS RESEARCH



Professor Xin Zhang (ME, MSE)

Professor Xin Zhang (ME, MSE) has received the 2016 Institute of Electrical and Electronics Engineers (IEEE) Sensors Council Technical Achievement Award (advanced career) for her "distinguished contributions to the field of micro/nanoelectromechanical systems, addressing a wide range of important problems in advanced materials, biophotonics and energy."

The council fosters community among engineers who work with sensors through publications, conferences and technical committees that allow members to share knowledge and exchange ideas. Zhang will attend the award presentation at the IEEE Sensors 2016 conference in Orlando, Florida, in November.

The award honors a member of the council who has made outstanding contributions to the field of sensors, evidenced by publications and patents. Zhang has published more than 130 journal articles and has been recognized for excellence in research and education.

In the area of advanced materials, Zhang has applied MEMS techniques to develop metamaterials, arrays of engineered structures that act like artificial atoms and exhibit unusual properties such as negative refractive indices and cloaking. She has focused on creating metamaterials in the terahertz range (wavelengths between optical and microwave frequencies) that may ultimately be used for imaging, chemical detection, surveillance and high-speed electronic circuits.

In biomedicine, Zhang has developed a MEMS-based toolset that uses a unique sensing approach to analyze cellular behavior, yielding knowledge that could improve our understanding of cardiovascular, liver and other diseases and potentially lead to novel therapies. In the energy domain, Zhang has explored microfluidic applications in the mid-IR range and developed micro gas chromatography and microfluidic communication systems designed to improve the efficiency and safety of oil and gas extraction. —SARA CODY

NEWS BYTES

FACULTY

Assistant Professor **James Bird** (ME) has received the Office of Naval Research 2016 Young Investigator Program award for his research, "Bubbling Underwater to Breakup Biofilms and Lift Early Settlers (BUBBLES)." Bird also received the ENG Early Career Excellence Award, which celebrates the recent, significant, high-impact research achievements of exemplary tenure-track faculty members who are within 10 years of receiving their PhD.

Associate Professor **Harold Park** (ME) won the International Association for Computational Mechanics' John Argyris Award for Young Scientists. Sponsored by Elsevier and named in honor of Professor John Argyris, a Greek

mathematician who is credited with developing the Finite Element Method, the award is given every two years in recognition of outstanding accomplishments, particularly published papers by researchers aged 40 or younger.

Assistant Professor **Darren Roblyer** (BME) has been awarded a St. Baldrick's Research Grant totaling \$100,000. A volunteer-powered and donor-centered charity dedicated to raising money for childhood cancer research, St. Baldrick's Foundation provides grants to support research that aims to find cures and better treatments for pediatric cancers. With this funding, Roblyer's team plans to develop imaging technologies that use near-infrared light to track the molecular and metabolic response of tumors during chemotherapy.

STUDENTS & ALUMNI

Carissa Bellardine Black (BME'01, MS'03, PhD'06), Director of Venture Capital at Medtronic, has been named a 2016 Medtech Boston 40 Under 40 Health Care Innovator, which recognizes commitment to changing the current health care system for the better.

Roger Hajjar (EE'88), founder and CTO of Prysm, won the 2016 Adele De Berri Pioneers of AV Award, given annually to recognize individuals who have made significant contributions to the science of audiovisual experiences. Hajjar was honored for his Laser Phosphor Display (LPD) technology, a novel display platform that leverages single-wavelength lasers to excite a phosphor screen and create images.

A team of ECE entrepreneurs won first place in the BUzz Lab Student Venture Competition at the Tech, Drugs and Rock n' Roll event sponsored by the BU Technology Development office. Their project, THOR, aims to address the significant cost of human labor in agriculture by employing an autonomous drone to provide valuable data collection and analysis. The team beat 14 other finalists in a public online vote to net the \$1,500 cash prize. ■



Team THOR members (L to R) Junkai He (EE'16), Yiyang Wu (EE'16), Emily Ubik (EE'16), Daniel Vasilyonok (EE'16) and Barron Roth (CE'16)

PHOTOGRAPH BY FRANK CURRAN