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News Release

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U.S. Researchers Collaborate to Reintegrate Biology

Leveraging technology and interdisciplinary expertise to transform the biological sciences

Seminole, FL -- A field biologist, an immunologist and a climatologist walk into a room. It sounds like the start of a joke only a scientist could love. But, add three more scientists from three more sub-disciplines who joined each other in a virtual chatroom and you'd get a fairly accurate picture of what went on at the two Reintegrating Biology Town Halls that were held in October and attended by more than 550 participants.

In the next event in the Reintegrating Biology workshop series, 400 researchers from across the country will meet for two and a half days December 4-6 in Atlanta, Austin, San Diego and virtually online to take part in four simultaneous Jumpstart meetings.

It's an exciting time for the field of biology given that the latest technological advancements -- from computation to gene editing -- are revealing completely new areas of research. The Reintegrating Biology workshop series aims to identify the exciting new research questions that could be addressed by combining approaches and perspectives from different subdisciplines of biology, the key challenges and scientific gaps that must be addressed to answer these questions, and the physical infrastructure and workforce training needed.

Facilitating Team Science

Reintegrating Biology is a project funded by the National Science Foundation (NSF) through a grant to the University Corporation for Atmospheric Research (UCAR) and Knowinnovation (KI), which has been using deliberate creativity to facilitate interdisciplinary workshops for scientists since 2004.

“Everybody can see that there's value in doing these larger interdisciplinary systems-level analyses. That’s not the issue,” said Michael Ibba, professor and chair of the Department of Microbiology at The Ohio State University. “The fact is that only certain people have felt they have the bandwidth to engage in this kind of activity because it’s challenging to find common ground.”

Ibba, who is a member of the NSF Biological Sciences Advisory Committee, participated in one of the 90-minute Town Hall sessions. He said meeting virtually with scientists he had never met was far more productive than he expected. “You had to put very little into it to get a lot out of it. It was a great way to show an alternative to the conventional way of setting up collaborations.”

The Town Halls were designed to help organizers understand what researchers consider to be the most interesting or compelling questions that might be tackled by integrating disparate sub-disciplines of biology. Participants were so engaged in this activity that many kept the 90-min conversations going for two hours or more.

The Jumpstarts are designed to be equally engaging. Researchers will be encouraged to have fun exploring the big questions that emerged from the Town Halls -- those that could be answered by reintegrating across biological subdisciplines. These big questions were synthesized into the following “playgrounds”:

- What is the unexplored potential in biological evolution?
- How do biological traits and phenotypes scale across life?
- How do biological entities interact and communicate through life?
- How do biological species and systems achieve resilience and robustness?
- How do we predict structure and function in biology?
- How could we manipulate biological systems to further understand the rules of life?

The Next Generation

Gretchen North, Ph.D. is also a member of NSF’s Biological Sciences Advisory Committee and a professor of Biology at Occidental College in Los Angeles. North’s focus is plant physiological ecology and how plants respond to limited water supplies. She has collaborated with geologists and economists looking at questions relevant to climate change. North took part in a virtual Town Hall and will also be attending the virtual Jumpstart.

While her focus will be the science during the Jumpstart, North will also have the undergraduates at her institution in mind. “I also think about what type of education will enable a young scientist to become a member of an interdisciplinary team,” she said. “There are scientific skills that cut across all disciplines.” For example, North points to the need for quantitative literacy. “Our students need to understand the strengths and limitations of the computational approach.”

Evolutionary biologist Daniel Bolnick, Ph.D., attended a virtual Town Hall and will be participating in the Jumpstart meeting in Austin. Bolnick is a professor of Ecology & Evolutionary Biology at the University of Connecticut. He works on the evolution of immune systems, using stickleback fish as a model system. Bolnick said he is looking forward to working with others on how to answer the questions identified during the Town Halls, as well as meeting more scientists from disparate fields.

“There's really very little opportunity once you become a professor to learn something dramatically new outside your comfort zone,” Bolnick said. “And it's a shame because we get into this line of work because we enjoy learning new things.”

UCAR *is a hub for the Earth system sciences and a gateway to cutting-edge resources and services. UCAR’s Cooperative Programs for the Advancement of Earth System Science (CPAESS) provides event management for the scientific community enabling the promotion of collaboration, idea sharing, interdisciplinary research, and community-building.*

KI *is an international organization with offices in the U.S. and Europe dedicated to accelerating scientific innovation. The KI team designs and facilitates creativity-driven, in-person and virtual events that foster cross-disciplinary collaborations and build scientific communities. The company partners with a variety of organizations whose missions include driving advances in innovation and achieving excellence in research. KI’s clients range from national funding bodies to regional colleges and have included the United Nations, the National Science Foundation, and the Engineering and Physical Sciences Research Council UK.*

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