BEACON Center nets $22.5 million grant to continue evolution research

Michigan State University has been awarded $22.5 million by the National Science Foundation to continue the research, education and outreach activities of the BEACON Center for the Study of Evolution in Action. See a video: https://www.youtube.com/watch?v=gOIK-C4-H7s.

Since 2010, BEACON has brought together evolutionary biologists, computer scientists and engineers to explore evolution going on in today’s world. BEACON researchers have provided insights into the evolution of disease, reducing the evolution of antibiotic resistance and predicting how populations of organisms respond to climate change.

The use of digital organisms – self-reproducing computer programs operating in a controlled computer environment – allows researchers to explore evolutionary dynamics much more rapidly than studies in the lab or field. Understanding these processes contributes to better solutions of design and engineering problems of industrial and societal importance using evolutionary computational tools, said BEACON Director Erik Goodman. Goodman is a professor of electrical and computer engineering.

“BEACON’s world-class faculty members, all pulling toward common goals, enable our high level of scientific innovation, attracting top-notch graduate students and postdoctoral researchers to the best place in the world to study evolution in action,” he said. “Researchers are drawn to BEACON because the frequent exchange of ideas makes it worthwhile for their research, energizing everyone involved. NSF’s renewal of BEACON will enable continuing breakthroughs in our understanding and harnessing of evolution in action.”

BEACON’s development of more-sophisticated evolutionary computational models to solve intractable problems in science and industry is creating new partnerships between biologists and engineers, said George Gilchrist, program director in NSF’s Division of Environmental Biology.

“In the first five years, BEACON has changed the landscape of evolutionary computation, creating a set of multidisciplinary scientists making strong contributions in both biology and engineering,” he said. “The second five years promises new advances in taking inspiration from the algorithmic nature of the evolutionary process to deliver robust solutions to some of the most-difficult problems in both science and industry.”

For example, Richard Lenski, MSU Hannah Distinguished Professor of microbiology and molecular genetics, continues to provide important insights about evolution and the process of natural selection. His long-term E. coli experiment distills the essence of evolution in petri dishes and has received a great deal of media attention from outlets including NPR, the New York Times, Science and New Scientist. In fact, Science referred to Lenski as “The Man Who Bottled Evolution.”

Kay Holekamp, University Distinguished Professor of zoology, continues to serve as one of the world’s leading behavioral ecologists through her studies of spotted hyenas in Kenya. Her long-running study has accumulated more than 25 years of data, covering nearly 10 generations, of spotted hyenas. She and her students have published more than 150 scientific papers.

BEACONITES also have made great strides toward understanding one of the major transitions in evolution – transforming from single-celled to multicellular life. Charles Ofria, director of MSU’s Digital Evolution Laboratory and an associate professor of computer science and engineering, and fellow BEACONITE Heather Goldsby, showed how reproductive division of labor could possibly have evolved. Their research suggests that separating germ cells – sperm and eggs – from somatic cells – all other cells – preserves genetic building blocks while allowing organisms to flourish.
Overall, BEACON researchers have published more than 565 peer-reviewed papers and written proposals that have netted nearly $47 million in external funds.

BEACON is headquartered at MSU, and its partners include University of Idaho, North Carolina A&T State University, University of Texas at Austin and University of Washington. BEACON stands as one of 14 NSF Science and Technology Centers, an elite group of research partnerships meant to unite and transform fields across science and engineering.

Related Website: Story courtesy of MSUToday
BEACON Center
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