



## MSU awarded \$25 million for NSF center to study evolution in action

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EAST LANSING, Mich. — Michigan State University announced today that it was awarded a \$25 million grant from the National Science Foundation to establish a center, bringing together scientists from across the nation to study evolution in action in both natural and virtual settings.

MSU has been awarded one of five highly coveted NSF Science and Technology Centers, officially titled "BEACON, an NSF Science and Technology Center for the Study of Evolution in Action." It will serve as a resource for academics and industry, performing basic research while helping create new technologies to solve real-world problems, ranging from the development of safer, more efficient cars to systems that detect computer intrusions.

BEACON is short for the "Bio/computational Evolution in Action CONSortium." For more information, visit <http://special.news.msu.edu/beacon> [<http://special.news.msu.edu/beacon>] or <http://beacon.msu.edu> [<http://beacon.msu.edu>].

"BEACON will conduct research on fundamental evolutionary dynamics in both natural and artificial systems," said Erik Goodman, MSU professor of electrical and computer engineering and director of the center. "In addition, we will educate a generation of multidisciplinary scientists, and improve public understanding of evolution at all levels."

In contrast to evolutionary studies focusing on fossil records or comparison of DNA among species to discover common ancestry, BEACON will focus on evolution as an ongoing process, using real organisms in laboratories and at field sites, and using "digital organisms" undergoing real evolution on computers.

BEACON will involve more than 30 faculty researchers in MSU's College of Engineering, College of Natural Science, College of Agriculture and Natural Resources, and Lyman Briggs College.

Four other universities will partner with MSU: North Carolina A&T State University, University of Idaho, University of Texas at Austin and University of Washington.

"BEACON is multidisciplinary to its core," Goodman said. "In addition to making discoveries in basic science and applications, it will prepare a new generation of researchers with the kind of insight that comes from first-hand experimentation with evolution in the lab and in the computer."

"The problems we face and the questions we seek to answer are far too complex to fit into traditional academic frames," MSU President Lou Anna K. Simon said. "This program will demonstrate again how we at MSU apply unique cross-cutting approaches to more fully understand the sublime processes that shape us and our world."

BEACON will unite biologists who study natural evolutionary processes with computer scientists and engineers who are harnessing these processes to solve real-world problems.

"We have an incredible opportunity now for the two-way flow of ideas and methods between biology and engineering," said co-principal investigator Richard Lenski, Hannah Professor of Microbiology and Molecular Genetics. "We can use deep biological principles to stimulate innovation in computational realms and, at the same time, use the speed and precision of computers to explore open questions in biology."

BEACON will promote the transfer of discoveries from biology into computer science and engineering design, while using novel computational methods and systems to address complex biological questions that are difficult or impossible to study with natural organisms.

"We will use digital organisms, which are self-replicating computer programs that evolve in a very natural, open-ended fashion, allowing experiments that parallel those performed in experimental evolution laboratories as well as mirroring more targeted evolutionary computation applications," said Charles Ofria, co-PI and associate professor of computer science and engineering.

"BEACON will open up countless new opportunities for MSU students and faculty in the Ecology, Evolutionary Biology and Behavior program, and permit us to offer a suite of new programs and exhibits for the public at the MSU Museum and at our partner universities," said co-PI and zoology professor Kay Holekamp.

"Public understanding and acceptance of evolutionary science can't help but improve once people see the practical utility and economic value of harnessing Darwin's law," said Robert Pennock, co-PI and professor of philosophy of science. "Evolution works and being able to see it in action is the ultimate proof."

The university has long prided itself on its lack of barriers between disciplines and on its many successful collaborations across the campus.



Erik Goodman, professor of electrical and computer engineering, will serve as director of the NSF-funded Science and Technology Center known as BEACON.



Richard Lenski, Hannah Professor of Microbiology and Molecular Genetics, will serve as co-director of the MSU's NSF-funded Science and Technology Center known as BEACON.



Charles Ofria, associate professor of computer science and engineering, will serve as co-director of MSU's

"Evolution is an elegant process that identifies optimal solutions to the biological fitness problem," said James Kirkpatrick, dean of the College of Natural Science. "BEACON will support transformative research to develop computational algorithms based on evolutionary processes to solve real world problems."

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