

In the race of life, better an adaptable tortoise than a fit hare

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EAST LANSING, Mich. — When it comes to survival of the fittest, it's sometimes better to be an adaptable tortoise than a fitness-oriented hare, a Michigan State University evolutionary biologist says.

In this week's Science magazine, [Richard Lenski, MSU Hannah Distinguished Professor of Microbiology and Molecular Genetics](#) (<http://myxo.css.msu.edu/>), and colleagues show that more adaptable bacteria oriented toward long-term improvement prevailed over competitors that held a short-term advantage.

The discovery that the less-fit organisms overtook their in-shape counterparts surprised the researchers at first. But it turns out to work something like a game of chess.

"In games it makes sense to sacrifice some pieces for an eventual winning move," said Lenski, co-principal investigator of BEACON (<http://beacon-center.org/>), MSU's National Science Foundation-funded Science and Technology Center. "The eventual winners were able to overcome their short-term disadvantage over the course of several evolutionary moves by producing more beneficial mutations."

Lenski is recognized as a leading evolutionary experimentalist, recording evolutionary change over 52,000 generations of bacteria grown during nearly 25 years. He and his team recently revived a frozen population of E. coli and compared the fitness and ultimate fates of four clones representing two genetically distinct lineages. One lineage eventually took over the population even though it had significantly lower competitive fitness than the other lineage that later went extinct.

By replaying evolution over and over with the clones, the researchers showed that the eventual winners likely prevailed because they had greater potential for further adaptation.

"In essence, the eventual loser lineage seems to have made a mutational move that gave it a short-term fitness advantage but closed off certain routes for later improvement," Lenski said. "And the dead-end strategy allowed the eventual winners to catch up and eventually surpass the eventual losers."

So, yes, sometimes the tortoise really does beat the hare.

Lenski's collaborators include co-author Robert Woods, an MSU graduate who worked in Lenski's laboratory and is now a physician scientist at the University of Michigan; Jeffrey Barrick, another Lenski lab researcher now on the faculty at the University of Texas; Tim Cooper from the University of Houston; MSU undergraduate student Mark Kauth; and University of Houston student Utpala Shrestha.

While Darwin's theory of natural selection has been confirmed by a great deal of other research, it has never before been observed directly for so many generations and in such detail as Lenski's long-term experiment has afforded. [Lenski's research is supported by the National Science Foundation](#) (http://www.nsf.gov/news/special_reports/darwin/textonly/bio_essay1.jsp), the Defense Advanced Research Projects Agency and by MSU AgBioResearch.

To watch the NSF's interview with Lenski, go to http://www.nsf.gov/news/news_summ.jsp?cntn_id=119029&org=NSF&from=news (http://www.nsf.gov/news/news_summ.jsp?cntn_id=119029&org=NSF&from=news).

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Richard Lenski is the Hannah Professor of Microbiology and Molecular Genetics.

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- [Richard Lenski Science paper \(opens in new window\)](#) (<http://news.msu.edu/media/documents/2011/03/53e182ec-ef42-435c-b456-aa001f2bed9e.pdf>)
- [BEACON](#) (<http://beacon-center.org/>)
- [Evolution: Past, Present and Future](#) (http://www.nsf.gov/news/special_reports/darwin/textonly/bio_essay1.jsp)
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