"I call this the experiment that keeps on giving," says Michael Lenski. "Even after 25 years, it's still generating new and exciting discoveries. From the models, we can predict how things will evolve—how fit the bacteria will become —if future generations of scientists continue the experiment long after I'm gone." (Credit: Josh Leo/Flickr (http://www.flickr.com/photos/joshleo/6865367904/in/photostream/))

NO 'FITNESS PEAK' IN SIGHT FOR EVOLVING BACTERIA

MICHIGAN STATE UNIVERSITY (HTTP://WWW.FUTURITY.ORG/UNIVERSITY/MICHIGAN-STATE-UNIVERSITY/)

➜ Original Study (http://www.sciencemag.org/content/early/2013/11/13/science.1243357.abstract)

Posted by Layne Cameron-Michigan State (http://www.futurity.org/author/michigan-state-cameron/) on November 15, 2013

Twenty-five years and more than 50,000 generations of bacteria reveal that microbes are becoming more and more fit, evolutionarily speaking, with no end in sight.

In a paper published in the current issue of *Science* (http://www.sciencemag.org/content/early/2013/11/13/science.1243357.abstract), Michael Wiser, lead author and graduate student in Richard Lenski's lab at Michigan State University, compares it to hiking.

RELATED ARTICLES ON FUTURITY

(http://www.futurity.org/aphid-immunity-shaped-by-friendly-bacteria/)

Cornell University (http://www.futurity.
university/)

**Aphid immunity shaped by friendly bacteria (http://www.futurity.
immunity-shaped-by-friendly-bacteria/)**

(http://www.futurity.org/tb-blocking-molecule-discovered/)

Indiana University (http://www.futurity.org/univers university/)

TB-blocking molecule discovered (http://www.futurity.org/tb-blocking-molecule-discovered/)

(http://www.futurity.org/monkey-%e2%80%98dorks%e2%80%99-lack-friends-of-friends/)

D
U
(
u

M
‘
l
f
o
f
(
%
l
f
o
f

“When hiking, it’s easy to start climbing toward what seems to be a peak, only to discover that the real peak is far off in the distance,” Wiser says. “Now imagine you’ve been climbing for 25 years, and you’re still nowhere near the peak.”

Only the peaks aren’t mountains. They are what biologists call fitness peaks—when a population finds just the right set of mutations, so it can’t get any better. Any new mutation that comes along will send things downhill.

The bacteria in Lenski’s lab are still becoming more fit even after a quarter century, living in the same, simple environment.

Biologists have known that organisms keep evolving if the environment keeps changing, but they’ve previously thought that adaptation would eventually grind to a halt if the environment stayed constant for a long time.

FROZEN BUT ALIVE

Wiser pulled hundreds of samples from the deep freezer that contains a frozen fossil record—bacteria all the way back to generation 0 in Lenski's 25-year experiment.

And these fossils, unlike dinosaurs, are alive. So they can be competed against samples from different generations to measure the trajectory—the path—of the bacteria as they climbed for 50,000 generations toward the fitness peaks.

"There doesn't seem to be any end in sight," says Lenski, professor of microbiology and molecular genetics. "We used to think the bacteria's fitness was leveling off, but now we see it's slowing down but not really leveling off."

Wiser finds that the trajectories matched a type of mathematical function called a power law. Although the slope of the power-law function gets less and less steep over time, it never reaches a peak.

Noah Ribeck, co-author and postdoctoral researcher, built a model using a few well-understood principles.

“It was surprising to me that a simple theory can describe the entirety of a long evolutionary trajectory that includes initially fast and furious adaptation that later slowed to a crawl,” Ribeck says.

“It’s encouraging that despite all the complications inherent to biological systems, they are governed by general principles that can be described quantitatively.”

WHEN WILL IT END?

“I call this the experiment that keeps on giving,” Lenski says. “Even after 25 years, it’s still generating new and exciting discoveries. From the models, we can predict how things will evolve—how fit the bacteria will become—if future generations of scientists continue the experiment long after I’m gone.”

Lenski hopes that an endowment could be secured to keep the experiment going forever, he adds.

The National Science Foundation supports Lenski’s research. Wiser, Ribeck and Lenski are also participants in the NSF-funded MSU BEACON Center for the Study of Evolution in Action.

Source: Michigan State University (http://msutoday.msu.edu/news/2013/no-peak-in-sight-for-evolving-bacteria/)

DOI: 10.1126/science.1243357 ➜ Original Study (http://www.sciencemag.org/content/early/2013/11/13/science.1243357.abstract)

Related Topics: bacteria (http://www.futurity.org/topic/bacteria/), evolution (http://www.futurity.org/topic/evolution/)

NEXT UP

ROBOTS BUILT TO TAKE PHOTOS OF 'TRICKY' OCEAN FLOOR (HTTP://WWW.FUTURITY.ORG/ROBOTS-BUILT-TO-TAKE-PHOTOS-OF-%E2%80%98TRICKY%E2%80%99-OCEAN-FLOOR/)

Stanford University (http://www.futurity.org/university/stanford-university/)

0 COMMENTS

ADD A COMMENT

FUTURITY