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# How Viruses Evolve, and in Some Cases, Become Deadly

*Michigan State researchers show how new viruses evolve, and in some cases, become deadly. (Credit: Michigan State University/Jeremy Polk/NSF)*

ScienceDaily (Jan. 27, 2012) — Researchers at Michigan State University (MSU) have demonstrated how a new virus evolves, shedding light on how easy it can be for diseases to gain dangerous mutations. The findings appear in the current issue of the journal *Science*.

The scientists showed for the first time how the virus called "Lambda" evolved to find a new way to attack host cells, an innovation that took four mutations to accomplish. This virus infects bacteria, in particular the common *E. coli* bacterium. Lambda isn't dangerous to humans, but this research demonstrated how viruses evolve complex and potentially deadly new traits, noted Justin Meyer, MSU graduate student, who co-authored the paper with Richard Lenski, MSU Hannah Distinguished Professor of Microbiology and Molecular Genetics.

"We were surprised at first to see Lambda evolve this new function, this ability to attack and enter the cell through a new receptor--and it happened so fast," Meyer said. "But when we re-ran the evolution experiment, we saw the same thing happen over and over."

This paper follows recent news that scientists in the United States and the Netherlands produced a deadly version of bird flu. Even though bird flu is a mere five mutations away from becoming transmissible between humans, it's highly unlikely the virus could naturally obtain all of the beneficial mutations at once. However, it might evolve sequentially, gaining benefits one-by-one, if conditions

are favorable at each step, Meyer added.

Through research conducted at BEACON, MSU's National Science Foundation Center for the Study of Evolution in Action, Meyer and his colleagues' ability to duplicate the results implied that adaptation by natural selection, or survival of the fittest, had an important role in the virus' evolution.



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**Journal Reference**:

1. J. R. Meyer, D. T. Dobias, J. S. Weitz, J. E. Barrick, R. T. Quick, R. E. Lenski. **Repeatability and Contingency in the Evolution of a Key Innovation in Phage Lambda**. *Science*, 2012; 335 (6067): 428 DOI: 10.1126/science.1214449

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