Natural selection may not produce the best organisms

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"Survival of the fittest" is the catch phrase of evolution by natural selection. While natural selection favors the most fit organisms around, evolutionary biologists have long wondered whether this leads to the best possible organisms in the long run.

A team of researchers at The University of Texas at Austin, led by Drs. Matthew Cowperthwaite and Lauren Ancel Meyers, has developed a new theory, which suggests that life may not always be optimal. The results of this study appear July 18th in the open-access journal *PLoS Computational Biology*.

Genetic mutations create the raw material that natural selection acts upon. The short-term fate of a mutation is often quite clear. Mutations that make organisms more fit tend to persist through generations, while harmful mutations tend to die off with the organisms that possess them. The long-term consequences of mutations, however, are not well understood by evolutionary biologists. The researchers have shown that what may be good in the short run, may hinder evolution in the long run.

The team developed computer models of RNA molecules evolving by mutation and natural selection. RNA molecules, which are very similar to DNA, play key roles in essential life processes and serve as the genetic material for some of our deadliest viruses, including influenza and HIV.

Their computer models show that the evolution of optimal organisms

often requires a long sequence of interacting mutations, each arising by chance and surviving natural selection. As Cowperthwaite explains, "Some traits are easy to evolve – formed by many different combinations of mutations. Others are hard to evolve – made from an unlikely genetic recipe. Evolution gives us the easy ones, even when they are not the best."

The group's analysis of RNA molecules from a wide variety of species suggests that life is indeed dominated by the "easy" traits, perhaps at the expense of the best ones.

Citation: Cowperthwaite MC, Economo EP, Harcombe WR, Miller EL, Ancel Meyers L (2008) The Ascent of the Abundant: How Mutational Networks Constrain Evolution. PLoS Comput Biol 4(7): e1000110. doi:10.1371/journal.pcbi.1000110

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