

Study questions 'cost of complexity' in evolution

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Higher organisms do not have a “cost of complexity” — or slowdown in the evolution of complex traits — according to a report by researchers at Yale and Washington University in *Nature*.

Biologists have long puzzled over the relationship between evolution of complex traits and the randomness of mutations in genes. Some have proposed that a “cost of complexity” makes it more difficult to evolve a complicated trait by random mutations, because effects of beneficial mutations are diluted.

“While a mutation in a single gene can have effects on multiple traits, even as diverse as the structures of brain, kneecap and genitalia, we wondered how often random mutation would affect many traits” said lead author Gunter Wagner professor and chair of ecology and evolutionary biology at Yale. The phenomenon wherein mutation in a single gene can have effects on multiple traits is known as pleiotropy.

This study showed that most mutations only do affect few traits. Further, the effect of an individual mutation is not dampened because of its effects on other traits.

Observing 70 skeletal characteristics in the mouse, the researchers identified total of 102 genomic regions that affect the skeleton. They concluded that substitution in each genome segment affected a relatively small subset of characteristics and that the effect on each characteristic increased with the total number of traits affected.

“You wouldn’t expect to make a lot of random adjustments — at the same time — to tune up a car,” said Wagner. “Similarly, it appears that tuning up a complex trait in a living organism is well coordinated and the effects of pleiotropy are more focused than we thought.”

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