

BENEFITS OF SEXUAL SELECTION CONFIRMED AT THE GENOMIC LEVEL

In 2015, Lumley et al. (1) in a Nature paper showed something striking in flour beetles (*Tribolium castaneum*): populations that had evolved for years under strong sexual selection survived inbreeding far longer than populations where sexual selection had been removed. It was a compelling experimental support for the idea that sexual selection helps purge harmful mutations from a population. But the evidence, however convincing, was entirely observational: survival curves and fitness declines, not the genome itself.

A decade on, the very same experimental *Tribolium* lines, carried forward for over 150 generations, have been sequenced. In a new PNAS study, Pointer et al. (2) directly counted deleterious mutations in beetles from the strong- versus weak-selection lines. The result: populations under strong sexual selection carry significantly fewer harmful mutations (missense-deleterious and nonsense variants), with no loss of overall genetic diversity.

What had been inferred only from phenotypes ten years ago now finds direct confirmation at the level of the sequence itself.

This brings to mind Richard Lenski (Michigan State University) and his Long-Term Evolution Experiment (LTEE) with *E. coli*. It started in 1988 and is still ongoing (over 75,000 generations). For years the lines were tracked only phenotypically (fitness curves, colony morphology), until, around generation 33,000, when a line emerged that was capable of metabolizing citrate aerobically (Cit+), a trait almost never observed in *E. coli*. The real breakthrough came with sequencing: Blount, Borland & Lenski (2) and later Blount et al. (3) identified the "potentiating" mutations that had accumulated over time and made that leap possible, explaining at the genomic level what phenotypic observation had only documented.

1. <https://www.nature.com/articles/nature14419>
https://www.pnas.org/doi/10.1073/pnas.2608675123?url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org&rfr_dat=cr_pub++0pubmed
2. <https://www.pnas.org/doi/full/10.1073/pnas.0803151105>
3. <https://www.nature.com/articles/nature11514>