

# What causes hybrid vigor?

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Plant scientists at the John Innes Centre have provided a new solution to an old debate on why species hybrids can be more vigorous than their parents. In a study to be published online next week in the online open access journal *PLoS Biology*, the researchers found a type of genetic "noise" caused by a surprising degree of variation in gene activity even for highly similar traits in closely related species. They found that when species hybridise, some of the variation in gene activity may be cancelled out, leading to greater vigour.

Enrico Coen and colleagues analysed the trait that causes flower [asymmetry](#) in two closely related species of snapdragon. They measured the activity of two relevant genes and its effect on the trait. The "noise" or variation they identified only has a very minor effect on a species for any single gene, but the collective effect for many genes could be substantial, reducing overall species performance. They suggest that [natural selection](#) may be unable to eliminate the noise they identified. Hybridisation, however, might partly eliminate the noise.

"This is the first study that analyses the consequences of variations in gene expression on conserved traits in closely related species," said Professor Coen, from the John Innes Centre.

The results show that hybrids might be expected to exhibit increased performance in basic traits such as growth. However, they also show that in the longer term, other traits such as those involved in [sexual reproduction](#) might be expected to perform less well, accounting for reduced fertility of hybrids.

"Gene expression levels are free to drift around during evolution within particular bounds," said Professor Coen. "But the cumulative effects of variation explain the conflicting phenomena of hybrid superiority and inferiority."

This explanation of hybrid vigour covers natural species as well as domesticated varieties. The findings avoid some of the pitfalls of previous explanations.

"Breeders already know there is no magic hybrid vigour gene, otherwise they would have used it by now," said Professor Coen. "What our study shows is how and why hybridisation can have such a strong impact on performance," said Professor Coen.

**More information:** Rosas U, Barton NH, Copsey L, Barbier de Reuille P, Coen E (2010) Cryptic Variation between Species and the Basis of Hybrid Performance. PLoS Biol 8(7): e1000429.

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