# Separate species, shared genomes: Butterfly genome reveals promiscuous sharing of large regions of DNA code

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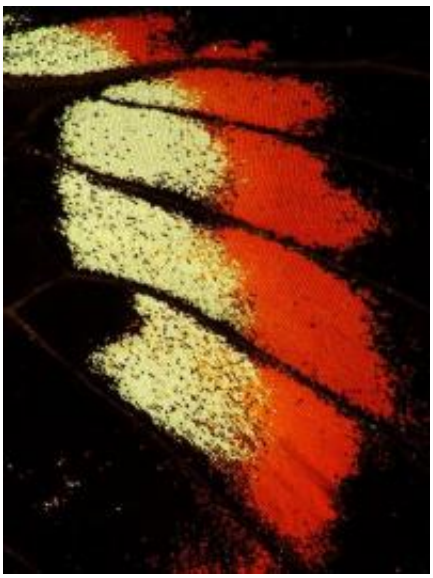

Based on the new sequence, scientists found that different species copy each other's wing patterns by exchanging genes, a process thought to be very rare, especially in animals. Credit: Mathieu Joron

A landmark effort to sequence the genome of a South American butterfly has revealed the key behind its unusual ability to mimic other butterflies.

A first for science, the genome sequencing work is the product of an international group of researchers, dubbed the *Heliconius* Genome

Consortium, who examined the genome of the Postman butterfly (*Heliconius melpomene*), a well-known species that lives in the Peruvian Amazon. Using that data as a guide, they then examined the genetic make-up of two other closely-related butterfly species – *Heliconius timareta* and *Heliconius elevatus*.

All three species were selected for the study because they each share similar color patterns on their wings as a way to ward off predators.

The Consortium's surprising finding, as described in a paper published May 16 in *Nature*, is that the various species all look similar because they share the parts of their DNA that deal with color patterns.

*"Heliconius* butterflies, exhibit an extraordinary amount of color-pattern mimicry between the species, and with species in other groups," Mallet said. "We have found that species share the parts of the genome that code for color pattern loci, with a major impact on the survival of these butterflies in the wild."

The genetic sharing between species, researchers believe, is the result of hybridization. Considered extremely rare, particularly in animals, hybridization occurs when insects of two different species interbreed in the wild.

The resulting hybrid offspring share traits with both mother and father. Though often considered evolutionary dead-end, hybrids occasionally interbreed with a parent species, in the process introducing new genes that can help populations adapt to new or changing environments.

"What we show is that one butterfly species can gain its protective colour pattern genes ready-made from a different species by hybridizing (or interbreeding) with it – a much faster process than having to evolve one's colour patterns from scratch," said Kanchon Dasmahapatra, a

postdoctoral researcher at the University College of London's Department of Genetics, Evolution, and Environment, and a co-author of the paper.

"This project really changes how we think about adaptation in general," said Marcus Kronforst, a Bauer Fellow at Harvard, who participated in the sequencing. "Evolutionary biologists often wonder whether different species use the same genes to generate similar traits, like the mimetic wing patterns of Heliconius butterflies. This study shows us that sometimes different species not only use the same genes, but the exact same stretches of DNA, which they pass around by hybridization."

A total of 80 researchers in 32 research universities and institutions from eight countries worked on this genome project, while a subset of nine laboratories funded the sequencing of the 290 million DNA bases using new high-throughput technologies, allowing the work to proceed without major dedicated grant funding.

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