

The ecology and evolution of heliconius butterflies

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Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=20469641&lokasi=lokal>

Abstrak

Heliconius butterflies have contributed hugely to our understanding of evolution over the last 150 years. These brightly coloured tropical butterflies are famous for their great diversity of wing patterns and also repeated convergence of pattern due to mimicry. The book explores their ecological relationships with Passiflora host plants, which provide an example of coevolution between host and herbivore. They also have coevolved relationships with cucurbit vines that provide a reliable source of pollen for the butterflies in return for pollination services. This has led to a shift in life history, with Heliconius characterized by a long lifespan and extended reproductive period compared to other butterflies. They also have large brains and unusual behaviours involving detailed spatial memory of their local environment. Their extraordinary diversity of wing patterns is controlled by a remarkably simple system of alternate alleles at just four major wing patterning genes. These genes regulate the development of patterning and colouration in the wing through regulatory changes that control expression of these key genes. These genes therefore offer insight into how developmental processes can evolve in rapid radiations, to produce such bewildering variety from just a few genetic building blocks. The alleles at these major patterning loci have been exchanged between species through adaptive introgression, offering a mechanism for convergent evolution through allele sharing. The genomes of sympatric species also show rampant evidence for genetic material exchanged through hybridization, which challenges our notions of species identity. Divergence in wing pattern also contributes to speciation. In summary, these butterflies have a well understood ecology, genetics, and behaviour, which offer some remarkable insights into tropical rainforest biodiversity and adaptive radiation.