

## Lesson 5 How Have Butterflies Survived?

### What's All the Flap About?

**Butterflies need their hind wings not to stay aloft but to evade predators**

By Fenella Saunders

<https://www.americanscientist.org/article/whats-all-the-flap-about>

It's not just poetic alliteration that makes the pat phrase "a butterfly fluttered by" so appropriate. The insects, although not always that speedy, often take a flight path that involves so many erratic dips and turns that they almost look out of control. But it's not because they can't do any better; Such unpredictable flight is how butterflies evade birds and other predators. However, most butterflies are brightly colored, which would seem to counter their evasiveness by making them easier to spot and track. "The question always bothered me," says Thomas Eisner, a biologist at Cornell University, "Why are butterflies flaunting their visibility?" As Eisner and Benjamin Jantzen, a doctoral candidate now at Carnegie Mellon University, report in the October 28 issue of the *Proceedings of the National Academy of Sciences*, a butterfly's ability to evade and its blatant pigmentation may go hand in hand,

The first step was to find out what physical feature of butterflies allows them to move so erratically. It's been known for about a century that the front wings in butterflies are the ones driven by the insect's muscles; the hind wings are passively coupled to the front ones. Eisner decided to investigate just what the back wings were doing by trimming them away bit by bit. To his surprise, he found that if he removed the entire hind wing, the insects had no problem flying. Indeed, when Eisner went on to test an extensive list of butterfly and moth species, he found that without exception they were all capable of sustained flight with only their front wings. "It is pretty startling that they're that overendowed with lifting surface," says Jantzen.

Eisner was careful not to use any rare species in the study. For each species, he used only one or two individuals. "I have one of the monarch butterflies in my home who has lived four months with me," Eisner says. In the wild the insects often run into obstacles and cause their own wing rips and tears. "Wing breakage is very common in natural circumstances," Eisner says. "I've found butterflies that have literally one wing completely gone, and they can fly."

To determine just what the hind wings contribute to the flight, Jantzen and Eisner set up an enclosure with two video recorders. They used two pest species, the white cabbage