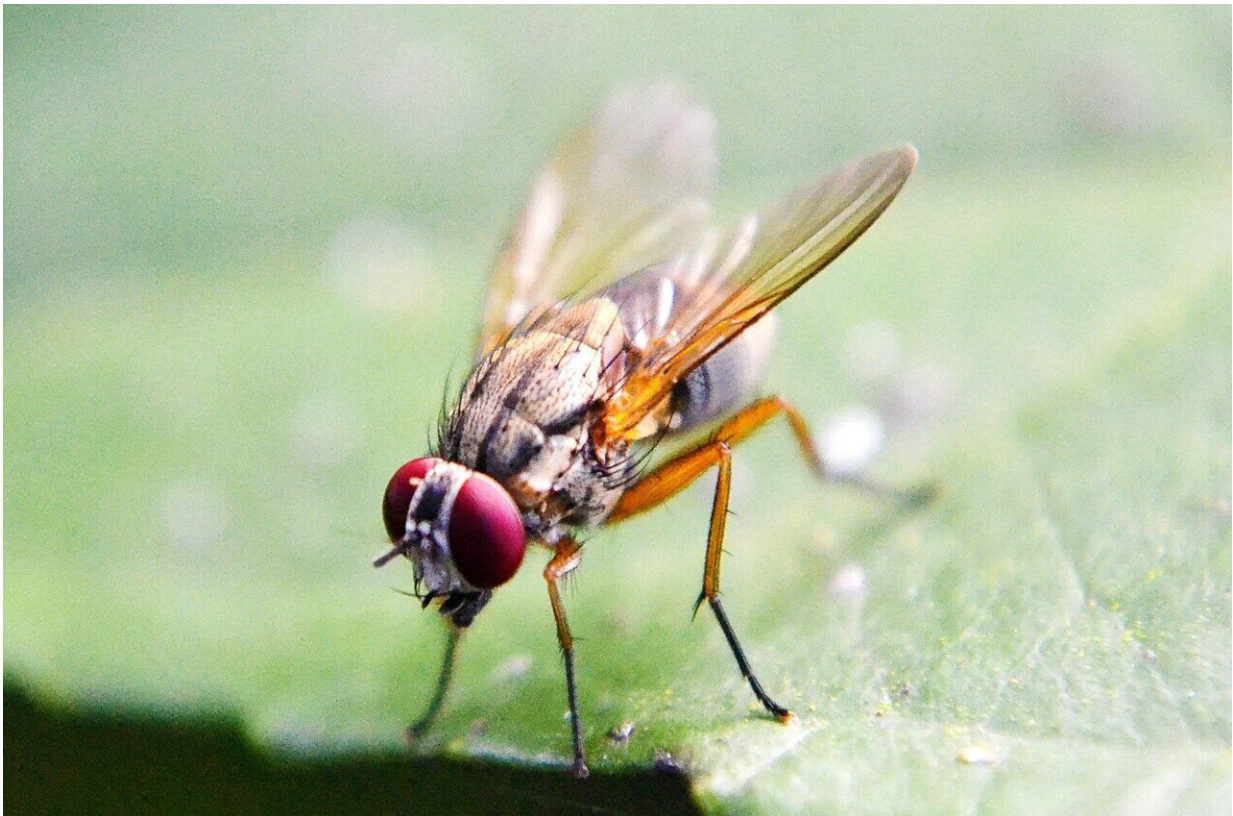


# Hunger provokes hangry behavior, even in fruit flies

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Credit: CC0 Public Domain

New research shows humans aren't the only ones who can turn irritable and aggressive between meals.

Findings from the University of East Anglia (UEA) show 'hangry' behavior in male *Drosophila melanogaster*, or fruit flies, during increasingly prolonged periods of [food deprivation](#). The flies, which feed on decaying fruit, grew ever more combative the longer they went without food—to a point; after 24 hours, the quarrelsome behavior plateaued.

The results of tests conducted at Oxford University show "'hangry' behaviors extend across even distantly-related animals," said senior author, Dr. Jen Perry of UEA's School of Biological Sciences. The research, "'Hangry' *Drosophila*: food deprivation increases male aggression," is published today in the journal *Animal Behavior*.

In nature, food abundance waxes and wanes, such that animals often find themselves in conditions of limited food availability. The researchers looked at how food deprivation affects behavior and interactions with other male fruit flies.

Dr. Perry said: "On the one hand, going hungry might lead to a weakened state, such that hungry individuals are less likely to win fights and so they display aggression less often.

"On the other, hungry individuals might be more motivated to fight to compete for food, leading to displays of aggression or 'hanger."

"We found that hungry male fruit flies display more hostility toward each other. They're more likely to aggressively lunge at each other and to swat at each other with their legs ('fencing' behavior), and they spend more time defending food patches.

"The hungrier they get, the more combativeness they display. In other words, just like humans, fruit flies get 'hangry.'"

The research also found that increased aggression in food-deprived males might result from a 'desperado' effect, in which individuals of poor condition engage in fights even when likely to lose, because they cannot gain fitness benefits by not engaging at all.

Both nutrient quantity and quality might influence aggression. The researchers focused on quantity because periods of food deprivation are common in natural insect populations, particularly as [fruit flies](#)' main diet consists of seasonally and spatially variable fruits.

Aggression is costly, carrying the risk of physical damage and predation, along with time and energy expenditure. Likewise, food deprivation can have long-term impact on internal state, affecting size, physiology and behavior.

During trials, an observer scanned each vial of male [fruit flies](#) a total of 16 or 32 times. Each scan lasted 3 seconds. In each scan, the observer recorded the number of lunges and tussles and the number of flies chasing, fencing, and occupying the food patch.

Dr. Danielle Edmunds, who conducted the experiments as part of her Ph.D. at the University of Oxford, said: "We observed a trend of increasing aggression with longer food deprivation, with significant differences between males with full access to food and those experiencing more than 48h food deprivation. Likewise, the likelihood of lunging and fencing was influenced by food deprivation duration.

"Increased aggression by food-deprived males might be a strategy to maximize short-term reproductive output in environments where survival is uncertain, but this will require further investigation.

"Our other studies show that show that poor food conditions early in life have just the opposite effect on aggression. Flies that grow up

experiencing limited food are less aggressive as adults. Together these results show that the effects of food limitation on aggression depend on when it is experienced in the life cycle."

The study was funded by the Biotechnology and Biological Sciences Research Council, Natural Environment Research Council, and Jesus College (Oxford).

"'Hangry' *Drosophila*: [food deprivation](#) increases male [aggression](#)," is published in the journal *Animal Behavior*.

**More information:** Danielle Edmunds et al, 'Hangry' *Drosophila*: food deprivation increases male aggression, *Animal Behaviour* (2021). [DOI: 10.1016/j.anbehav.2021.05.001](#)

Provided by University of East Anglia

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