

Love is blind for male fruit flies, who will choose sex over safety

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Fruit Fly *Drosophila immigrans*. Credit: Katja Schulz
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Male fruit flies will become oblivious to physical danger as they become more engaged in courtship and sex, new research shows.

Researchers at the University of Birmingham have shown that pursuit of a coveted reward—in this case a female fly—will cause a male fruit fly to ignore threats such as predation.

In the study, [published](#) in *Nature*, the team was able to show for the first time the [neural networks](#) in the fly's brain that direct this [decision-making process](#), revealing that the [neurotransmitter dopamine](#) has a leading role to play.

Lead researcher Dr. Carolina Rezaval said, "Every day we make decisions that require us to balance opportunities and risk—but we know little about what is happening in our brains as we make these choices. By studying the neural pathways that are activated in the brains of fruit flies we can find out more about these processes. As the fly pursues his [courtship](#) and is close to mating, we can clearly see that when a threat is introduced, he simply does not see it."

In their experiment, the researchers used two-photon microscopy to look at which neurons in the fly's brain were activated during the courtship. The team introduced an artificial threat using light and shadow to simulate the effect of a predator flying nearby.

Dr. Laurie Cazale-Debat, a leading researcher in Rezaval's group at the University of Birmingham, said, "During earlier stages of courtship, we found the presence of threat triggered certain visual neurons in the brain that interfere with neurons governed by serotonin. This prompts flies to abandon their courtship and escape the threat. As the courtship advances, however, the increase in [dopamine](#) blocks key sensory pathways, reducing the ability of the fly to respond to threat and causing it to focus on mating."

Dr. Rezaval explains, "The animal must decide about what is most important. Dopamine is key to this decision-making process, but the

levels of dopamine are closely related to the proximity of the goal—how likely is success?

"You can see this kind of motivation at play all the time among humans. Imagine you're climbing a mountain and you're close to the summit," added Dr. Lisa Scheunemann, a group leader from Freie Universität Berlin and a key contributor to the study. "If the weather changes and conditions become dangerous, you might disregard that [threat](#) because you are so close to your goal."

Dr. Rezaval concludes, "Our study shows that as courtship progresses, dopamine increases, acting as a sensory filter that blocks distractions and helps the animal focus on the task at hand when close to its goal. We are excited to explore if this is a general decision-making mechanism that is also present in mammals, including humans."

This work was done in collaboration with Dr. Lisa Scheunemann (Freie Universität Berlin), Dr. David Oswald's group (Charité—Universitätsmedizin Berlin) and Dr. Andrew Lin's group (University of Sheffield).

More information: Carolina Rezaval, Mating proximity blinds threat perception, *Nature* (2024). [DOI: 10.1038/s41586-024-07890-3](https://doi.org/10.1038/s41586-024-07890-3).
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