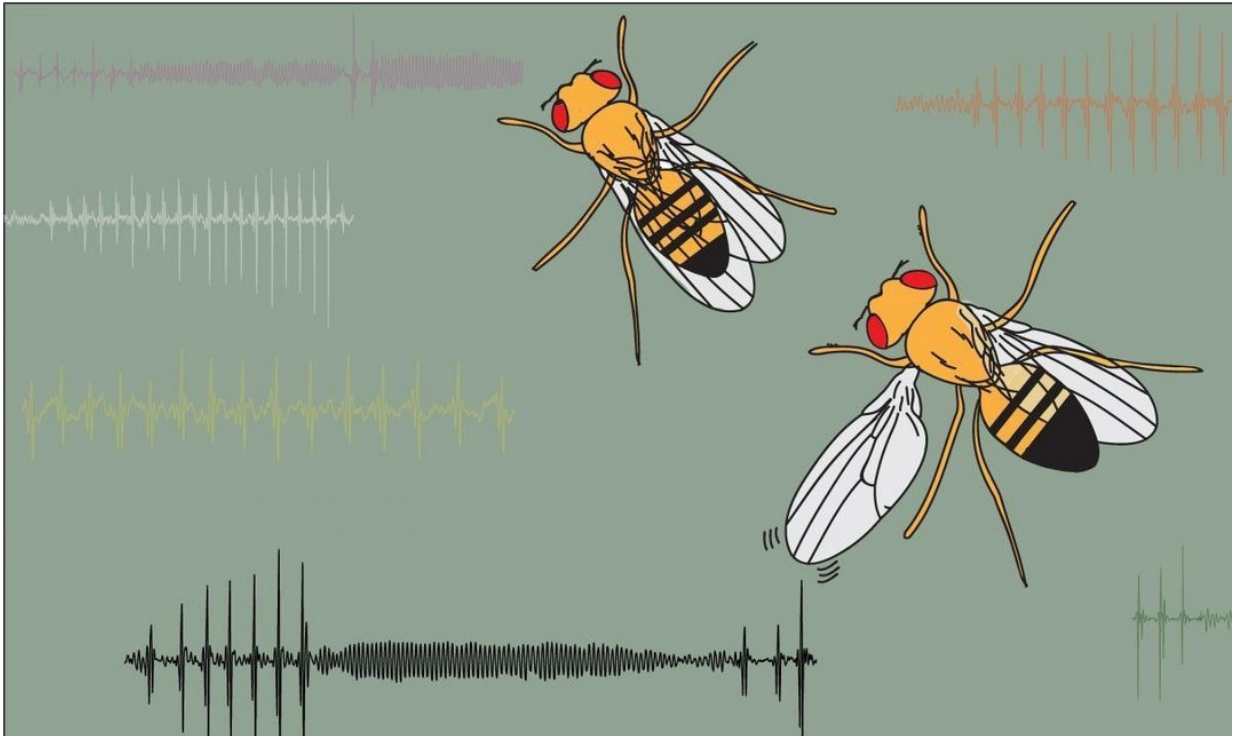


Flirting flies: More than just winging it

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Male fruit fly uses his song to attract the female. Credit: Angela O'Sullivan

Studies of the song of fruit flies have revealed new findings of neuron function in a recent study. These results could lead to new knowledge on how brains in general function, which in the longer term, may have medical significance.

Although they may be a nuisance, fruit flies are greatly appreciated by

scientists around the world. Known to the scientific community as *Drosophila melanogaster*, they are invaluable research organisms. They have assisted in the understanding of genetics, neural development, diseases such as cancer and [motor neuron disease](#), and much more.

The Philipsborn lab in Aarhus University uses fruit flies to understand the general mechanisms and principles of nervous system function, essentially how brains work. Even though [fruit flies](#) are incredibly small, they have roughly 200,000 brain [neurons](#) generating sophisticated behaviours such as learning, decision making, aggression and sleep. Perhaps most impressive in the fly's behavioural repertoire is its flying ability. They can fly through the air with astounding agility, integrating sensory information, and performing fast twists and turns.

Flies use wings for flight, but a male fly can also use its wings to sing. Ultimately, the principle objective of a male fly is reproduction, producing as many offspring as possible. Therefore, when a male meets a female fly, he tries to mate with her. He chases her while vibrating a wing to sing. But the female will only accept a male who sings a good quality courtship song which has rhythm and tune. The song is too weak for the human ear, so researchers must resort to small microphones and amplifiers to perceive the sound.

Angela O'Sullivan, a Ph.D. student in the Philipsborn lab, studies how the male generates this song. By examining the muscles and motor neurons needed for moving the wing in a highly controlled way, the researchers have begun to understand more general questions regarding how the nervous system generates complex motor patterns and uses one output system for very different behaviours.

Using cutting edge imaging techniques, the researchers looked through the fly's exterior, viewing in real time the activity of muscles and neurons while the fly was singing. They also used genetic tools to

manipulate individual motor neurons, to visualise the [motor neurons](#) and investigate song errors arising from the silencing of certain neurons. In their study, O'Sullivan and her colleagues have revealed novel findings on the song motor circuit. They found that male flies with defective wing motor systems sing a faulty courtship song, and are likely to have difficulties flying. Furthermore, they discovered that certain neuromodulators are important while the wings are used for flight as opposed to song.

The song serves as an honest signal; it is the male's way of publicising how fit he is. Flaws in the timing or patterning of the song indicate neuromuscular deficits, which in most cases, also lead to problems flying. It therefore pays to be a discerning female.

Many questions remain unanswered regarding this innate behaviour, but with continued research, scientists will learn more, and in the process, uncover new information on how brains in general function, which in the longer term, may have medical significance. The scientific article has just been published in the international journal *Current Biology*.

More information: Angela O'Sullivan et al, Multifunctional Wing Motor Control of Song and Flight, *Current Biology* (2018). [DOI: 10.1016/j.cub.2018.06.038](https://doi.org/10.1016/j.cub.2018.06.038)

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