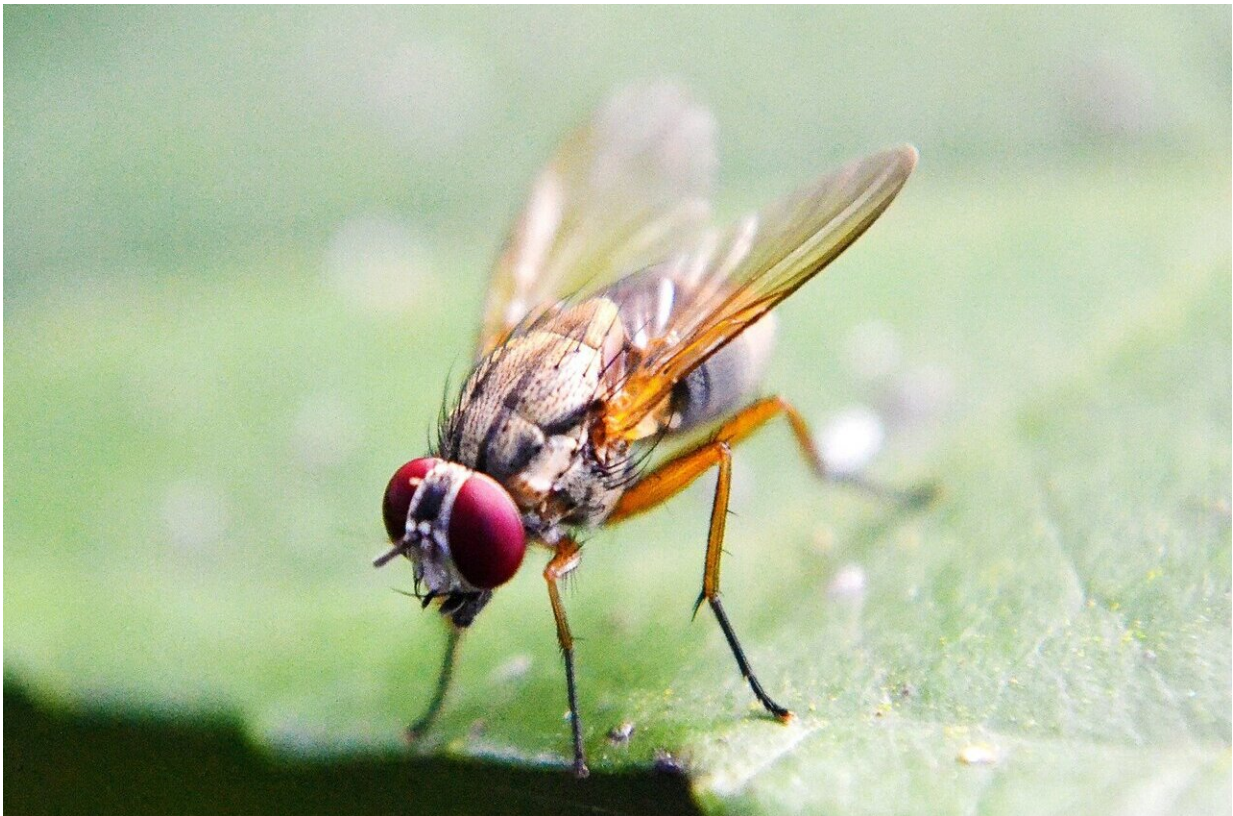


Scientists uncover a gene involved in sexual conflict in fruit flies

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Sexual conflict in fruit flies is governed by specifically wired neurons in the brain which have been pinpointed by scientists at the University of Birmingham, UK.

The research uncovers a gene directing development of these neurons and sheds new light on how certain behaviors—in this case sexual behaviors—are 'hardwired' into the brain. It also shows how [sexual conflict](#) drives the evolution of new species and offers a step towards understanding the process of evolution at a molecular and [cellular level](#).

Dr. Matthias Soller, the lead author on the paper, explained: "Darwin's theory on the origins of species is fundamental to evolutionary biology. But the molecular and cellular drivers of evolution are still a mystery." Co-author Dr. Irmgard Haussmann from Birmingham City University adds "Even we humans are evolving: 100 years ago no one thought of our electronic world requiring to adapt our brain to completely new tasks."

While this research offers a way to answer fundamental science questions, understanding the genetics of sexual behavior could also lead, eventually, to new ways of controlling [insect populations](#), for example in crop management or spread of insect-borne diseases like Malaria.

In the study, published in a *BMC Biology* collection "Neurons, Circuits and Behavior," the researchers focused on a particular molecule—called sex peptide—which is passed from the male fruit fly to the female during mating. Sex peptide is responsible for triggering the female's post-mating behavior, for example rejecting courting males and increasing the urge to lay eggs.

But sometimes the female needs to resist these behaviors, for example if there is not enough food, or if there are environmental reasons to not lay eggs. The ability to do this relies on a genetic mutation that the researchers were able to identify. This mutation affected the female's response to [sex peptide](#) and, having identified the mutation, the researchers were able to identify the specific gene that is essential for regulating the female's post-mating response.

Significantly, they found the gene, called Nup54, was present in every cell. Rather than being a signaling molecule present in a few neurons, as the research team expected, the Nup54 protein is a component of every cell's nuclear pore—the part of the cell that regulates which proteins are allowed into the nucleus and which messenger RNAs pass out of the nucleus for translation into protein.

"Nuclear pore genes are among the few [genes](#) that have been associated with the occurrence of new species," says Dr. Soller. "We think it's likely that these changes, including wiring of the brain and a change in [behavior](#), mark a very early stage of speciation, and therefore show one of the first cellular processes in evolution of new species."

More information: Mohanakarthik P. Nallasivan et al, Channel nuclear pore protein 54 directs sexual differentiation and neuronal wiring of female reproductive behaviors in *Drosophila*, *BMC Biology* (2021). [DOI: 10.1186/s12915-021-01154-6](https://doi.org/10.1186/s12915-021-01154-6)

Provided by University of Birmingham

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