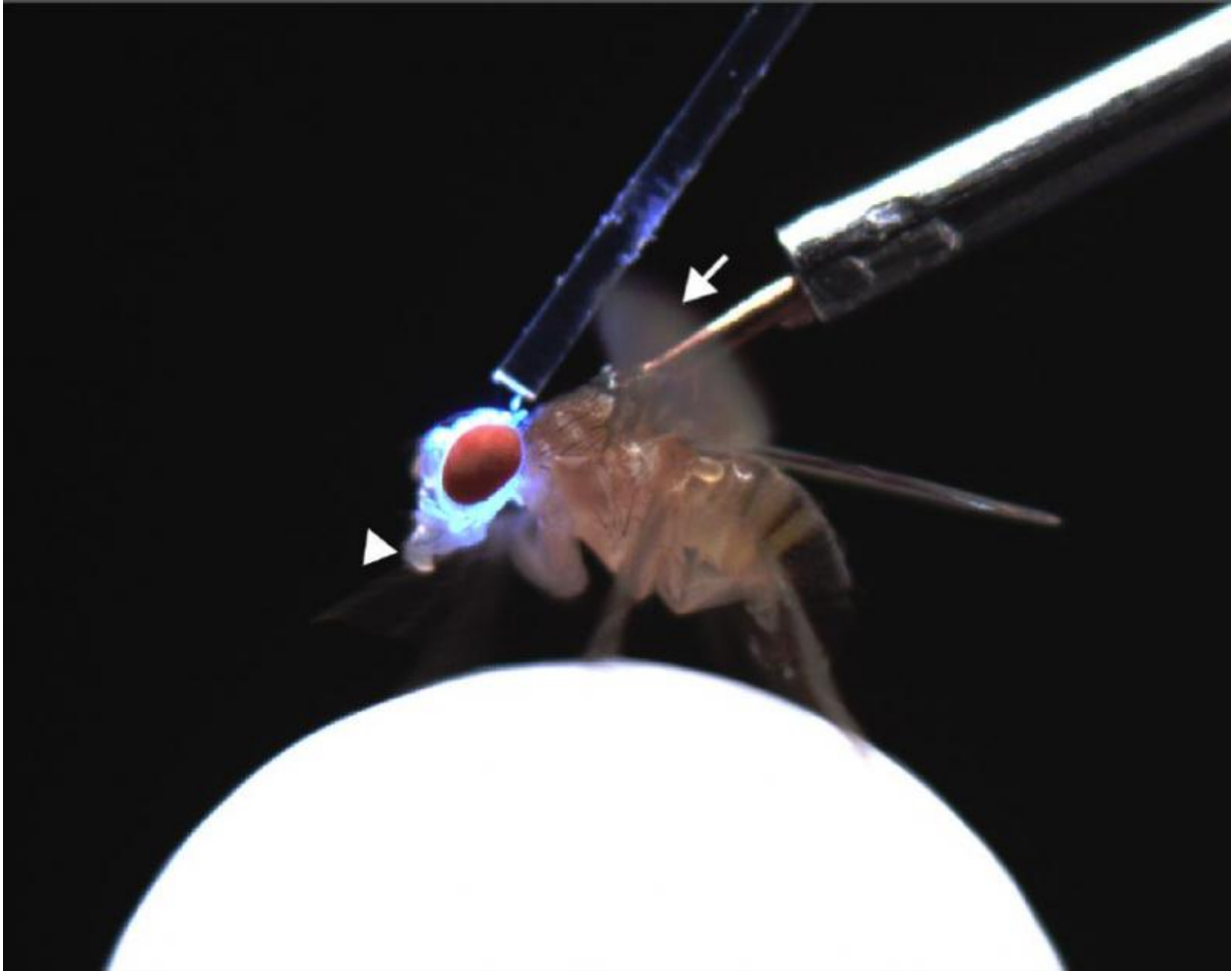


# Socialization alters fruit fly sexuality

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The optical stimulation of neurons in a region of the fruit fly brain are known to control courtship decision-making.

A genetic study on the courtship behavior of mutant fruit flies may

illuminate human sexual orientation.

Two Tohoku University scientists have discovered that homosexual behavior in certain groups of male fruit flies can be altered by their environment. Specifically, they have shown that the sexual preferences of male fruit flies with a mutant version of a gene known to affect male sexual behavior can vary depending on whether the flies are reared in groups or alone.

The neurons that express the fruitless (*fru*) gene "basically govern the whole aspect of male sexual behavior," explains neurogenetics professor Daisuke Yamamoto, who conducted the study with postdoctoral fellow Soh Kohatsu.

Yamamoto has been researching the [sexual behavior](#) of mutant fruit flies since the late 1980s. Normal male fruit flies tap the abdomen of a female to get a whiff of her sex pheromones before pursuing her to mate. In contrast, males with a mutant version of the *fru* gene show no interest in females; instead, they set off in vigorous pursuit of other males.

In his most recent study, Yamamoto wanted to analyze the role of vision in the courtship behavior of normal and mutant fruit flies. He optically stimulated neurons in a region of the fruit fly brain known to control courtship decision-making. The fruit flies were shown spots of white light flashing across a screen that represented walking females.

Normal fruit flies courted the spots only after priming with pheromones, but mutant males did not need pheromone priming or direct brain stimulation. The mutant fruit flies immediately followed the moving light spots and vibrated their wings in courtship.

However, this behavior was only displayed in mutant males reared in

groups. "We found that this kind of visually induced courtship [behavior](#) in the fru mutant males was blocked by isolating them right after their emergence from the pupa," says Yamamoto. The males reared by themselves did not react to the light spots, he says.

Yamamoto admits he was "terribly surprised" by the results, because he had previously never doubted that male-to-male courtship in fru mutant males was "solely genetically programmed". It appears that social interaction activates neurons that make mutant males hypersensitive to visual stimuli.

While Yamamoto is cautious about drawing conclusions on human [sexual orientation](#) from studies of [fruit flies](#), he believes some aspects of sexual orientation in humans could have a similar mechanistic basis to that of flies. "Our study offers a conceptual basis to explain how nature and nurture interact in shaping human sexual orientation," he says.

**More information:** Soh Kohatsu et al. Visually induced initiation of *Drosophila* innate courtship-like following pursuit is mediated by central excitatory state, *Nature Communications* (2015). [DOI: 10.1038/ncomms7457](#)

Provided by Tohoku University

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