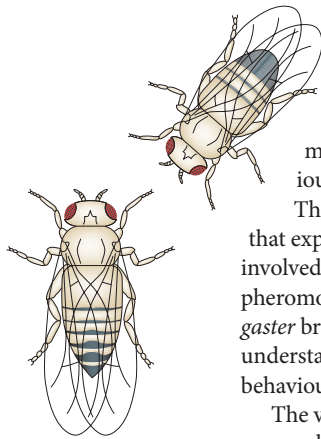


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**BEHAVIOURAL GENETICS**

## Turning flies on



Pheromones have been implicated in courtship and mating behaviours in many species. However, little is known about the molecular basis of the behavioural response to pheromones. The publication of three papers that explore the odorant receptors involved in the detection of a male pheromone in *Drosophila melanogaster* brings us a step closer to understanding what regulates these behaviours.

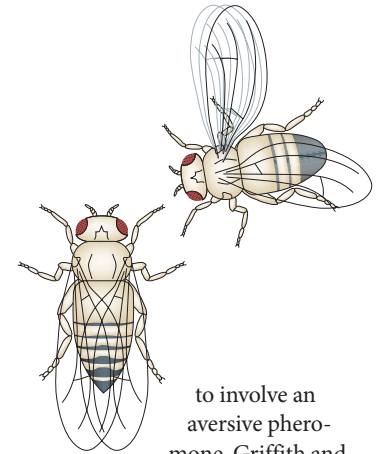
The volatile pheromone 11-*cis*-vaccenyl acetate (cVA) is produced only by male flies and is thought to be transferred to females during copulation. cVA is associated with an 'anti-aphrodisiac' effect, acting to discourage males from courting females who have already mated. Pheromones, like other odorants, are detected by olfactory receptor neurons (ORNs), most of which express one type of odorant receptor (OR). The researchers therefore set out to understand which ORs contribute to the response to cVA.

Dickson and colleagues investigated the role of one particular OR, OR67D, which can confer sensitivity to cVA when ectopically expressed in ORNs. They created transgenic flies that lacked *Or67d* expression and

monitored their courtship behaviour. Mutant males were more likely to court other males than usual, but continued to court virgin females as normal. By contrast, the mutation reduced female flies' responsiveness to mating with male flies. When cVA was applied to the abdomen of virgin females, wild-type males no longer attempted to mate, whereas mutant males were insensitive to the pheromone. This suggests that OR67D alone mediates the effects of cVA, which inhibits mating behaviour in males but increases mating behaviour in females.

Van der Goes van Naters and Carlson held cVA and other fly odours in a capillary tip close to the antennae of male and female flies to test which ORs respond to them at short-range. They used a system in which the endogenous receptor genes of one particular ORN are deleted and replaced with the ORs to be tested. They found that OR67D expression conferred responsiveness to cVA. However, they also identified a second OR, OR65A, which shared these properties. These two receptors may therefore help flies to recognise whether a potential partner is suitable for mating.

If an attempt to mate with a previously mated female is unsuccessful, a male fly will no longer try to mate with any females. This is termed 'generalized memory' and is thought



to involve an aversive pheromone. Griffith and colleagues compared extracts taken from virgin and mated females, and revealed increased levels of cVA in mated females. The presence of purified cVA in the test chamber was sufficient for generalized memory formation, and the authors showed that OR65A-expressing ORNs were required to sense the aversive nature of cVA.

These studies reveal a central role for cVA in regulating courtship and mating behaviour in male and female flies. However, whether OR67D is exclusively responsible for mediating the response to this pheromone requires clarification.

Katherine Whalley

**ORIGINAL RESEARCH PAPERS** Ejima, A. et al. Generalization of courtship learning in *Drosophila* is mediated by *cis*-vaccenyl acetate. *Curr. Biol.* 3 Apr 2007 (doi:10.1016/j.cub.2007.01.053) | van der Goes van Naters, W. & Carlson, J. R. Receptors and neurons for fly odors in *Drosophila*. *Curr. Biol.* 3 Apr 2007 (doi:10.1016/j.cub.2007.02.043) | Kurtovic, A., Widmer, A. & Dickson, B. J. A single class of olfactory neurons mediates behavioural responses to a *Drosophila* sex pheromone. *Nature* 29 March 2007 (doi:10.1038/nature05672)

