

# Flies avoid a plant's poison using a newly identified taste mechanism

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Many plants protect themselves from hungry animals by producing toxic chemicals. In turn, animals rely on detecting the presence of these harmful chemicals to avoid consuming dangerous plant material. A paper, published in this week's issue of *PLoS Biology*, investigates the response of an insect to a common plant weapon - the toxin L-canavanine.

The work, from authors at the Institute of Functional Genomic of Montpellier, finds that the fruit fly *Drosophila melanogaster* can recognize L-canavanine and identifies the cellular receptor that facilitates this recognition. Surprisingly, the receptor that identifies L-canavanine is not from the gustatory receptor family responsible for all known taste sensation in insects - instead it is a modified [glutamate receptor](#), called DmXR.

When [fruit flies](#) were forced to consume L-canavanine they subsequently failed to reproduce - all of the offspring died as [larvae](#) - thus showing an [evolutionary advantage](#) to evolving a mechanism to sense and avoid consuming the [toxin](#). The work - lead by Yves Grau - demonstrated that the mechanism is based on DmXR. First the authors showed that human cells modified to express DmXR would respond to L-canavanine, whereas unmodified cells did not respond.

Next, they demonstrated that fruit flies have the ability to modify their behavior when exposed to L-canavanine: when offered two sugar solutions the flies avoided the one spiked with L-canavanine. Genetically

modified *Drosophila* which had the DmXR receptor disabled showed no such preference, again indicating the key role of the receptor in the tasting of this toxin. By observing *Drosophila* behaviour, the authors found that the application of L-canavanine to the flies legs (where the taste receptors are) caused them to retract their mouthparts - thereby avoiding consuming the poison.

Understanding sensations in insects is not just of scientific interest - given that many insects are pests and vectors for disease, identifying chemicals that are insect-specific and the pathways that are involved may provide alternatives to insecticide use in the future.

More information: Mitri C, Soustelle L, Framery B, Bockaert J, Parmentier M-L, et al. (2009) Plant Insecticide L-Canavanine Repels *Drosophila* via the Insect Orphan GPCR DmX. *PLoS Biol* 7(6): e1000147. doi:10.1371/journal.pbio.1000147, [biology.plosjournals.org/perls ... journal.pbio.1000147](http://biology.plosjournals.org/perls...journal.pbio.1000147)

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