Picky-eater Flies Losing Smell Genes

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A UC Davis researcher is hot on the scent of some lost fruit fly genes. According to population biology graduate student Carolyn McBride, the specialist fruit fly Drosophila sechellia is losing genes for smell and taste receptors 10 times faster than its generalist relative Drosophila simulans. The findings could help researchers understand how some insect pests adapt to feeding on a particular plant.

Genes are lost when mutations destroy their function. "Drosophila sechellia may be losing genes that helped its ancestors detect and assess plants it no longer uses," said McBride, whose research was recently published in the journal *Proceedings of the National Academy of Sciences*.

A native of the Seychelles islands in the Indian Ocean, D. sechellia split from its sister species D. simulans half a million years ago -- just a blink of evolutionary time. While D. simulans feeds on a variety of plants, D. sechellia specializes in eating the Indian mulberry, which repels other fruit flies. D. sechellia has evolved resistance to the toxins of its host fruit, and a strong chemical attraction to its scent.

For her genetic analysis, McBride drew on the recently sequenced genomes of D. sechellia and D. simulans, which are available to the public.

"This is the first time that biologists have been able to compare whole genome sequences from closely related insects that differ dramatically in their ecology," she said. McBride also compared the genes of these two

flies to another close relative, the classic lab fruit fly Drosophila melanogaster.

She discovered that not only is the specialist fly losing genes for smell and taste receptors 10 times faster than the generalist, but its remaining sensory genes are also evolving at a more rapid rate. McBride said that the changes in these genes are likely related to the flies' different feeding strategies, because smell and taste are the primary senses that insects use to assess potential host plants.

"My work suggests that changes in these receptors help insects adapt to novel host plants," McBride said. "These genes may therefore be a good place to start looking for genetic changes that underlie host adaptation in other species, including agricultural pests."

Source: UC Davis

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