Smells like deceit: A record number of species use the same odor to exploit each other

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The open-access journal *Frontiers in Ecology and Evolution* reports the first known case where four species, all at different levels in the food chain, use a single odor to communicate with and ruthlessly exploit each other.

Plant-feeding insects are often attracted to odors that are released by damaged plant tissue because these plants are already under attack and so a good place to look for food, sexual partners, and egg-laying sites. The jumping plant louse *Diaphorina citri* hones in on the odor methyl salicylate that is released by damaged young leaves of citrus trees, whose sap is the only food of the young lice. But other species have evolved the capacity to take advantage of its attraction to methyl salicylate.

One of these is the bacterium *Canditatus Liberibacter asiaticus*, which infects citrus trees, hijacks its odor production, and forces it to release methyl salicylate to mimic an attack by plant lice. Jumping plant lice that fly towards the source of the odor are duped: they will not find enough food there, as the bacterium has drastically lowered the nutritional quality of infected leaves. This is a trick that forces the lice to quickly seek out another tree again, this time with the bacterium hitching a ride on their body. In this way, the bacterium can infect new citrus trees, where it causes the incurable and deadly disease huánglóngbìng.

Enter the wasp *Tamarixia radiata*, which lays its eggs on young jumping

plant lice, so that the wasp larvae can feed on them. Lukasz Stelinski and colleagues from the University of Florida asked whether the wasp is likewise attracted to the odor of methyl salicylate while hunting for plant lice. They placed female wasps in an olfactometer, a Y-shaped device that delivers two opposing air flows, each carrying a different odor. The wasps had the choice of flying towards methyl salicylate or to a control odor such as limonene, another compound produced by citrus trees.

The wasps were strongly attracted to the smell of both bacteria-infected and louse-infested citrus plants, and also to pure methyl salicylate. A further experiment revealed that the wasps were more likely to find and attack young plant lice on plants infected with the bacterium, or on plants that had been treated with methyl salicylate. This proves that the wasp finds its prey by eavesdropping on the odor signal exchanged between bacteria, citrus trees, and plant lice.

"Communication between species is widespread in nature, but almost always involves only two or three species. Here, we show for the first time that the same signal connects four different species, each at a different level in the food chain. Through their separate evolutionary histories, they independently hit on the use of methyl salicylate as a way to take advantage of their prey," says Stelinski.

More information: Plant pathogen-induced volatiles attract parasitoids to increase parasitism of an insect vector, *Frontiers in Ecology and Evolution*, journal.frontiersin.org/Journa … .2014.00008/abstract

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