Why silkworms find mulberries attractive

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Mulberry in Libya. Photo by Tark Siala, via Wikipedia.

A new study published online on May 7th in *Current Biology*, a Cell Press publication, has found the source of silkworms' attraction to mulberry leaves, their primary food source. A jasmine-scented chemical emitted in small quantities by the leaves triggers a single, highly tuned olfactory receptor in the silkworms' antennae, they show.

The results are contrary to the notion that insects are generally attracted to their host plants through the recognition of a blend of volatile compounds by a combination of receptors, said Kazushige Touhara of The University of Tokyo. In addition to the new insights into insect olfaction, the findings may also have practical implications for those who raise silkworms for the production of silk, he added.

Bombyx mori, the domesticated silkmoth, no longer occurs naturally in the wild. As a consequence, they have reduced mouthparts, do not feed, cannot fly, and respond only to a sex pheromone for reproduction.

Because of their commercial value and close association with humans, silkworms and their attraction to mulberry has long been of interest.

"In the mid-20th century, several volatiles emitted by mulberry leaves were reported to attract silkworms," Touhara said. "However, these previously identified odorants turned out to be weak attractants at best. None of the other abundant odorants in mulberry leaves attracted silkworms, either. Unexpectedly, we found that the potent attractant cis-jasmone was not an abundant volatile emitted from mulberry leaves at all; it is present only in small amounts."

Indeed, they found, the threshold amount of cis-jasmone needed to attract silkworms appears to be significantly lower than the amount of any attractant to food reported for other insect larvae, such as fruit flies and mosquitoes.

Earlier studies had been hindered by a limited understanding of olfaction at the molecular and genomic level, the researchers said. In the new study, Touhara's team applied new tools to the problem. After narrowing down the compounds emitted by mulberry leaves to the one that attracts silkworms, they went in search of the olfactory receptor genes responsible in the silkworms' genome.

They ultimately found 20 olfactory receptors that are active in the antennae of silkworm larvae. Of those, only one responds strongly to cis-jasmone. When that olfactory receptor is triggered to become active, the insects move toward the source of the smell.

Touhara said that cis-jasmone might be added to artificial diets fed to domesticated silkworms to increase the efficiency of their food intake. And, he added, if there are pest insects that are similarly attuned to single compounds, then chemicals designed to block the underlying receptors might serve as a new and rather safe form of pest control.

Source: Cell Press (news : web)