

New mosquito repellent could be frightening ... for the mosquitoes!

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Credit: Kathy Keatley Garvey, UC Davis Department of Entomology Close

In a small, narrow, temperature-controlled lab room at Vanderbilt University live some of the most deadly and dangerous animals in the world.

"These are [Anopheles mosquitoes](#) that still think that they're in [Central Africa](#). We won't tell them any different," says Laurence Zwiebel, professor of [molecular biology](#) and pharmacology.

Anopheles gambiae mosquitoes can be killers. In warmer climates, the bloodsuckers carry and spread diseases, including malaria, the second

most deadly transmitted disease in Africa. The mosquitoes growing up in Zwiebel's lab are disease-free. But, as Zwiebel points out, they still bite.

"Anopheles gambiae often shows a strong preference for biting people. How do they do this? What makes them so predisposed to bite humans?"

With support from the National Science Foundation (NSF), Zwiebel and his team want to find some answers. They know mosquitoes zero in on their next meal using their keen [sense of smell](#). "A mosquito can smell you and me from a very long distance and can track its way to you based on odor plumes that we're giving off," explains vector biologist Jason Pitts.

The team has identified microscopic odor receptors on the mosquito's antennae that look like tiny microscopic hairs. "We've identified large families of receptors in the mosquito," says Pitts.

Different hairs target different smells. Pitts says Anopheles' hairs home-in on human [body odors](#) from the carbon dioxide in our breath to the ammonia in our sweaty feet. "Some mosquitoes have been shown to be highly attracted to feet," he notes.

"The number of compounds that have been identified in human sweat number in the hundreds," says Pitts. "Things like carbon dioxide, ammonia, which is a [byproduct](#) of [human sweat](#), and lactic acid, that we give off in sweat, other animals don't. These are often cited as compounds that are part of the human signature. Which of those compounds are the most important [for the Anopheles mosquito] is still a subject of debate."

Researchers often refer to a mosquito as "her" because only female mosquitoes bite. They drink the blood for reproduction--to make eggs. "So, only female mosquitoes spread disease. A female will drink her

weight in blood when she takes a blood meal from you," says Pitts.

The team has also isolated chemicals that target odor receptors and could one day be used to formulate a new class of mosquito repellent, potentially more powerful than Deet. The new repellent would bombard the [mosquitoes](#) with so many strong odors, it would scare them away.

"It's literally screaming into a mosquito's nose," says Zwiebel.

Zwiebel points out that other insects, including agricultural pests, also have these receptors. So do honeybees. So, such repellants would have to be used carefully. A better understanding of how the receptors work could one day help take the bite out of the mosquitoes' ability to spread deadly disease.

Provided by National Science Foundation

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