New study provides a better understanding of how mosquitoes find a host

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The potentially deadly yellow-fever-transmitting *Aedes aegypti* mosquito detects the specific chemical structure of a compound called octenol as one way to find a mammalian host for a blood meal, Agricultural Research Service (ARS) scientists report.

Scientists have long known that mosquitoes can detect octenol, but this most recent finding by ARS entomologists Joseph Dickens and Jonathan Bohbot explains in greater detail how *Ae. aegypti*--and possibly other mosquito species--accomplish this.

Dickens and Bohbot, at the ARS Invasive Insect Biocontrol and Behavior Laboratory in Beltsville, Md., have shown that *Ae. aegypti* taps into the "right-handed" and "left-handed" structural nature of octenol, which is emitted by people, cattle and other mammals. This ability to detect the "handedness" of molecules has been shown in mammals, but the discovery is the first case of scientists finding out how it works in an insect, according to the researchers.

When they hunt for a blood meal, mosquitoes hone in on a variety of chemicals, including carbon dioxide, lactic acid, ammonia and octenol. Octenol is one of many carbon-based compounds that have a molecular structure that can take on either a "right-handed" or "left-handed" form. Each form is a mirror image of the other, and a form's "handedness" is determined by how its molecular bonds are assembled.

The scientists used frog eggs to help them make their discovery. They

injected RNA from *Ae. aegypti* into the frog eggs, allowing the egg membranes to mimic the mosquito's ability to detect octenol. Then they attached microelectrodes to the frog egg cell membranes, passed octenol over them and recorded the electrical signals stimulated by the odors.

They ran the tests using both the right- and left-handed forms of octenol. The scientists found heightened electrical activity when the membrane was exposed to the right-handed form, and weakened activity when it was exposed to the left-handed form.

There are many natural compounds that can take on either a right-handed or left-handed form. While the effects of those differences on many plants and animals remains a mystery, the report, published in *PLoS ONE*, shows the effects of octenol's dual structure on the yellow fever mosquito and adds to scientists' understanding of how mosquitoes sense the world around them. It also may open the door to speedier development of better mosquito repellents and traps, according to Dickens.

Provided by United States Department of Agriculture

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