Certain compounds stimulate mosquito taste receptors

August 5 2014, by Sandra Avant

Mosquitoes not only have a sense of smell for certain insect repellents, but they also have a sense of taste for these chemicals, according to U.S. Department of Agriculture (USDA) scientists.

Joseph Dickens, an entomologist with the Agricultural Research Service (ARS) Henry A. Wallace Beltsville Agricultural Research Center (BARC) in Beltsville, Maryland, discovered for the first time that a taste receptor located on a mouthpart of mosquitoes is sensitive to DEET, the most common active ingredient in insect repellents.

Scientists have known for some time that DEET works by interacting with the mosquito's smell (olfactory) receptor cells, causing the insect to become confused and to fly away. Dickens' findings, published in *Naturwissenschaften*, demonstrate that DEET also interacts with a specific mosquito taste (gustatory) receptor, which could indicate the existence of a sensory pathway for taste that deters blood feeding by the insects.

Dickens and his colleagues, working in BARC's Invasive Insect Biocontrol and Behavior Laboratory, recorded responses of yellow fever mosquitoes to six different chemicals. They tested a feeding deterrent, quinine and various insect repellents: DEET, citronellal, picaridin and IR3535.

The experiments involved pinpointing the pair of tiny flaps located at the tip of the mosquito's proboscis or "beak." These flaps, which have tiny

hairs that serve as chemical sensing organs, make contact with a human's skin. Electrodes were placed on a single hair to record the electrical impulses from nerve cells within the hair.

Scientists discovered that three sensory cells were activated in the hair. One cell was activated by salt, a second cell was activated by sugar, and a third cell was activated by either quinine or the insect repellents tested, including DEET.

Mosquitoes can sometimes transmit pathogens that cause harmful diseases like malaria, yellow fever and West Nile virus. Learning more about their sense of taste and smell could help scientists develop better protection methods and management techniques for mosquitoes, other insects and arthropods.

ARS is USDA's principal intramural scientific research agency.

Provided by Agricultural Research Service