

News: Animals, Physiology

Rough lessons can lessen the pull of human scent on a mosquito

Bursts of shaking teach the bloodsuckers to be indifferent to the odor of people's skin

By Susan Milius 10:00am, November 27, 2017



SCENT OF A HUMAN Nasty experiences can change an *Aedes aegypti* mosquito's inclination to follow certain odors, such as the whiff of human skin.

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DENVER – After unpleasant lessons in the lab, mosquitoes can learn some restraint in their zest for pursuing the scent of human skin.

The test, a kind of aversion therapy for mosquitoes to see if they can associate smells with bad experiences, was reported at the annual Entomological Society of America meeting.

“Mosquitoes have this very challenging task of finding food that’s hidden under the skin of mobile and defensive hosts,” said Clément Vinauger of Virginia Tech in Blacksburg. He’s investigating whether repeated scares such as near misses of a slapping hand might change mosquito reactions to odors.

Female mosquitoes go about their dangerous blood quest by tracking a mix of cues: plumes of carbon dioxide, the sight of looming objects, up-close body heat and body scent (*SN*: 8/22/15, p. 15). The final targeting can be annoyingly picky. Even within the same target species, such as humans, some individuals turn out to be mosquito magnets, while others aren't so alluring.

Vinauger and colleagues wafted odors over *Aedes aegypti* mosquitoes during 10 rounds of 30-second educational shaking in a small cage. Outside the lab, slapping at a mosquito may not seem to discourage the relentless return of the whining, but the test setup found an effect.

A day after stern lessons, the mosquitoes had become "indifferent" to the skin odor of normally quite attractive humans, Vinauger reported November 7 at the meeting. When placed at the base of a Y-shaped tube, mosquitoes flew into the Y branch that smelled of human skin no more than would be expected by random chance.

Mosquitoes learned to associate some smells with the awful shaking more readily than other odors. Other sessions in these experiments, for instance, easily turned mosquitoes against the whiff of a rat, which contains octenol. Chicken scent, which doesn't have octenol, wasn't something the mosquitoes learned distaste for, the researchers reported at bioRxiv.org. Such differences in learnability might mean that mosquito brains have shortcuts for picking up information about certain odors that can make learning easier.

On the flip side, these *Ae. aegypti* mosquitoes can learn to associate even certain yucky odors with something positive, Vinauger and colleagues already reported in 2014. After just two blood meals smelling of the compound DEET, mosquitoes no longer showed much aversion to a 10-percent solution of the repellent.

How these capabilities might play out in the real world is still a big question, says Ring Cardé, whose lab at the University of California, Riverside also studies odor and other cues mosquitoes use to hunt down a meal. Mosquitoes that specialize in preying on humans don't need to learn attraction to a human scent, he points out. The insects are drawn to it immediately. Surviving a close call from a blood source and then seeking something that smells different might mean missing good opportunities to feed. He would predict "that a mosquito should try and bite an available host, period."

Citations

C. Vinauger et al. Dopamine modulation of host learning in *Aedes aegypti* mosquitoes. Entomological Society of America annual meeting, Denver, November 7, 2017.

C. Vinauger et al. Modulation of host learning in *Aedes aegypti* mosquitoes. bioRxiv.org. Posted August 24, 2017. doi: 10.1101/172716.

Further Reading

L. Hamers. Malaria molecule makes blood extra-alluring to mosquitoes. *Science News*. Vol. 191, March 18, 2017, p. 10.

S. Milius. Good luck outsmarting a mosquito. *Science News*. Vol. 188, August 22, 2015, p. 15.

B. Webster, E.S. Lacey and R.T. Cardé. Waiting with bated breath: Opportunistic orientation to human odor in the malaria mosquito, *Anopheles gambiae*, is modulated by minute changes in

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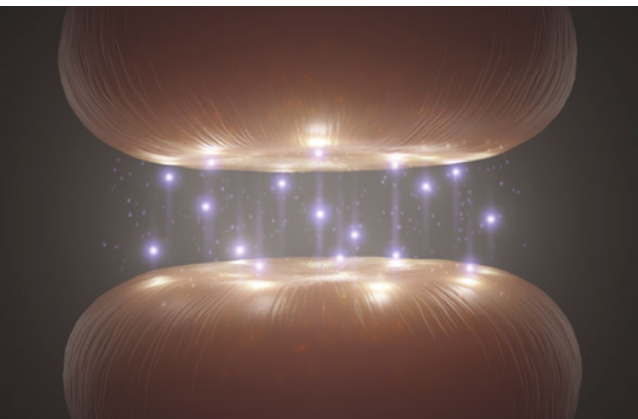
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