Mosquitoes can hear over distances much greater than suspected before

Mosquitoes can hear over distances much greater than anyone suspected, according to researchers at Cornell and Binghamton University.

Their findings were published in the journal *Current Biology*.

Until now, scientists believed that organisms required eardrums for long-range hearing, and that the feathery antennae with fine hairs that mosquitoes and some insects use to hear only worked at close distances of several centimeters (a few inches).

A series of experiments has now provided neurophysiological and behavioral evidence that Aedes aegypti mosquitoes – which transmit such diseases as yellow fever, Dengue, Zika, West Nile and Chikungunya viruses – can hear specific frequencies as far away as 10 meters (32 feet) or more.

These frequencies overlapped well with the frequencies of female mosquitoes in flight as well as human speech.

“It’s been known for quite a long time that male mosquitoes are drawn to the sound of the female’s beating wings,” said Ron Hoy, professor of neurobiology and behavior at Cornell and the paper’s senior author. Gil Menda, a postdoctoral researcher in Hoy’s lab, is the paper’s first author.

Hoy noted that since mosquitoes mate in mid-air, the sound of the female’s wings buzzing sets the males in motion. Menda fitted mosquitoes with an electrode in their brains and made neurophysiological recordings of the auditory nerve being stimulated by pure-tones emitted from a loudspeaker 10 meters

away.

“They’re hearing at distances that normally require ear drums, but these are hairs,” said Hoy. Ear drums work by picking up pressure from sound waves, while tiny hairs sense sound from air particles vibrating at certain frequencies.

They then moved the nerve physiology equipment to a super-quiet anechoic room run by collaborator Ron Miles, professor of mechanical engineering at Binghamton University. “It’s the quietest room in the Northeast and possibly in the country,” Hoy said.

“We found the sweet spot of frequency that the mosquitoes are sensitive to was between 150 to 500 hertz,” Menda said.

The mosquitoes’ frequency range for hearing also overlapped with human speech. “The most energetic frequencies of an average human vowel are in the range of 150 to 900 hertz,” Hoy said, so “they should be able to hear” people speaking.

While the study offers both neurophysiological and behavioral evidence that male mosquitoes hear sounds from far field, it offers no proof that they use it to home in on people. The insects are known to pick up sensory cues such as carbon dioxide, odors and warmth to locate people. But the results do show an intriguing correlation, Hoy said. Though the results do not offer viable new avenues for mosquito control, they open the door for developing highly sensitive directional microphones and hearing aids that use fine hairs that sense the speed of air particles as they are jostled by passing soundwaves.

Source:

http://news.cornell.edu/stories/2019/02/study-mosquitoes-can-hear-10-meters-away