

Controlling *Aedes aegypti* populations and how they sense people

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Mosquitoes are the most dangerous animals in the world. They are the vectors for pathogens that afflict one billion people per year. *Aedes aegypti* is especially troubling because it infects 400 million people each year with viruses that cause dengue, yellow fever, and other diseases. Therefore, it is essential to devise improved strategies for reducing the incidence of mosquito-borne disease.

I will describe two approaches to control the diseases spread by *Ae. aegypti*. The first is to more effectively suppress populations of *Ae. aegypti*, which are constantly moving to new locations. Among the promising strategies for controlling *Aedes* is the sterile insect technique (SIT), which involves inundating mosquito populations with sterile males. If a sterile male mates first with a female, it will induce female sterility since females typically mates once. However, SIT has not been adequately successful in suppressing *Ae. aegypti* since the primary method to sterilize males is irradiation, which can reduce fitness and male mating competitiveness. I will describe our recent work which overcomes these limitations.

The second approach to reduce mosquito borne disease is to better understand how they sense people, and devise improved repellents. Mosquitoes employ multisensory integration to find humans. Among the host-derived stimuli they sense are CO₂, human odors, and visual cues. I will describe a new cue that mosquitoes use as part of their sensory arsenal to find humans. We found that they sense infrared radiation emanating from people and use this information in combination with other cues for highly effective navigation. Finally, repellents can protect against mosquitoes. DEET is most widely used repellent. However, it last only ~5-6 hours, has safety concerns, and damages many synthetic materials. I will describe our discovery of a safe, environmentally-sound insect repellent that lasts far longer DEET and that does not damage any synthetic tested.