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Mosquitoes: The Most Dangerous Animal on Earth?

Written by Patrick Keffe | Published on February 12, 2016



Mosquitoes infect humans with the Zika virus, yellow fever, dengue, malaria, and other diseases. Why are they so dangerous and what's being done about it?



Mosquitoes have bedeviled humans for centuries, spreading disease and death to millions. Today, the latest plague they bring is the Zika virus.

“Mosquitoes are perhaps the most dangerous animals in the world,” Omar Akbari, PhD, an assistant professor of entomology at the Center for Disease Vector Research at the University of California Riverside, told Healthline.

“They are the primary vectors for major human diseases such as yellow fever, malaria, and dengue fever, which together infect hundreds of millions of humans worldwide and kill millions each year.”

The World Health Organization, he added, reports that more than 50 percent of the world's population is presently at risk from mosquito-borne diseases.

Zika and other insect-borne diseases

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are traveling quickly with new reports every week.

On February 2, [Texas reported a case of Zika infection](#) transmitted by sex, rather than by a mosquito bite. The patient was infected after sexual contact with someone who had returned from Venezuela, where the virus is spreading.

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Omar Akbari, University of California Riverside

On February 9, the big island of [Hawaii declared a state of emergency](#) to deal with an outbreak of dengue fever, spread by infected mosquitoes. Since October, 250 cases have been confirmed on the island.

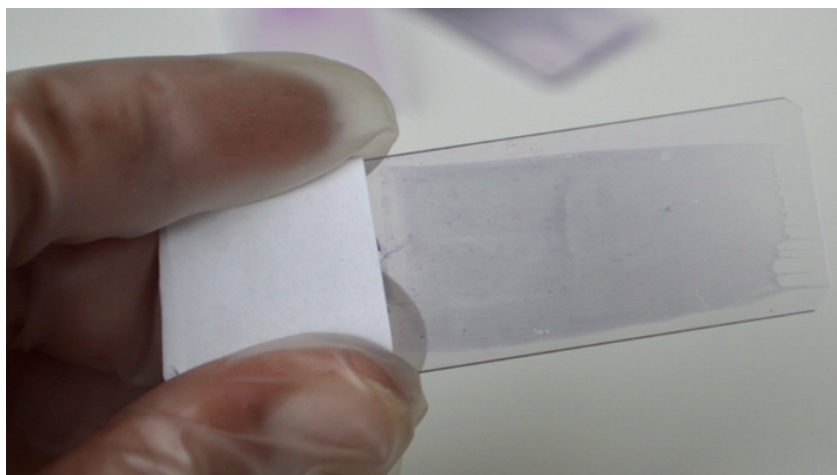
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Mosquitoes Tough to Fight

Current methods of preventing mosquito-borne diseases are highly inefficient, Akbari said.

While crucial mosquito research is under way in university labs, the U.S. Centers for Disease Control and Prevention (CDC) is also engaged in the global war against life-threatening diseases.

Dr. Lyle Peterson, MPH, leads the CDC's fight against insect-borne diseases. Peterson is director of the Division of Vector-Borne Diseases in the National Center for Emerging and Zoonotic Infectious Diseases in Colorado.



The center supports the CDC's mission to protect the American public from exotic and domestic bacterial and viral pathogens transmitted by mosquitoes, ticks, fleas, and other vectors.

Peterson told Healthline that the Zika virus was discovered in the mid-20th century in Africa.

“In 1947, the virus was first isolated from a rhesus monkey found in the Zika forest of Uganda,” he said. “Before 2007, at least 14 cases of human Zika virus disease had been documented in the literature, although other cases were likely to have occurred and were not published.”

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Mosquitoes Are Effective Transmitters

Since Zika was first reported in Brazil in 2015, cases have exploded in 24 countries or territories. The virus is spreading rapidly because mosquitoes are more effective transmitters of disease than even flies.

“Mosquitoes spread disease-causing agents, not the disease,” Peterson said. “They bite people to consume blood. Feeding allows the mosquito to produce eggs. When feeding, a mosquito pierces the skin like a needle and injects saliva into a person’s skin. This allows the disease-causing agent – for example, the Zika virus – into the site.”

Only a small fraction of fly species, however, will bite people, Peterson said. When a fly bites, it creates a wound and drinks blood from the site.

“When a fly bites, it does not directly inject saliva into the bite like a mosquito does,” Peterson explained. “Some diseases are transmitted by flies. But because fly feeding habits are different from mosquito biting habits, fewer pathogens are transmitted through fly bites.”

Since mosquitoes fly, they can also spread a disease more quickly than an illness such as Ebola, which is transmitted from person to person.

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Using Genes to Battle Mosquitoes

The Zika virus and other major deadly diseases are spread by just one of the world’s 3,500 species of mosquito.

Akbari’s research concentrates on *Aedes aegypti* or Asian tiger mosquito, common in the United States. It’s the major vector for dengue, chikungunya, yellow fever, and Zika.

Akbari wants to introduce and spread genes within the mosquito population that prevent the next generation of insects from transmitting a pathogen. In theory, that should reduce transmission of a virus, with a consequent reduction in infections or deaths, he said.


“To test this hypothesis,” Akbari said, “first we need a broad understanding of mosquito biology that we can use to develop gene-based strategies for engineering mosquitoes that are resistant to pathogens.

Then we need to engineer mosquitoes that are resistant to all types of infections. Finally, we need to develop tools to rapidly ‘drive’ these laboratory-developed genes into wild mosquito populations.”

Together, this approach conceivably can provide a foundation that has the potential to revolutionize vector control of mosquitoes, he said.

Akbari’s work at his U.C. Riverside lab is supported by a National Institutes of Health Career Transition Award, a grant from the California Cherry Board, and a private donation.

“We are a brand-new new lab,” he said, “but we hope to have results by sometime in early 2017.”

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