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New Type of More Problematic Mosquito-Borne Illness Detected in Brazil

A second form of the painful chikungunya virus has appeared in Brazil—one that could more easily spread, including to the U.S.

November 4, 2014 | By [Dina Fine Maron](#) |

When a mosquito-borne disease first arrived in the Western Hemisphere last year, humans were relatively lucky. The disease, which causes crippling joint pain persisting for weeks or even months and for which there is no known therapy or vaccine, hopped from the Caribbean islands to eventually land in the U.S. and the rest of the [Americas](#). But the type of chikungunya creeping across the region then was one that could only readily spread via *Aedes aegypti*, a mosquito that is uncommon in the U.S.

That ecological happenstance provided some modicum of protection. Chikungunya spread by bites from *Aedes aegypti* was first detected in Saint Martin last year and in the U.S. this [summer](#). The smaller range of that type of mosquito, however, has helped ensure the disease has not spread widely in the U.S. Right now, chikungunya is primarily limited to Florida and the territories of Puerto Rico and the U.S. Virgin Islands. Only [11 cases](#) in Florida have been confirmed as locally transmitted in the U.S. (although another 1,545 were brought in by travelers from other locations).

Americans were particularly fortunate that the other predominate strain of chikungunya—one that derives from Africa and has fueled significant outbreaks in Asian countries for the past decade—was not seen in this hemisphere. The African strain has been accumulating mutations that allow it to be spread more easily by *Aedes albopictus*. That bug is common in the eastern U.S. and can survive colder temperatures. It also lays its eggs in a wider variety of settings, making it more difficult to exterminate. Chikungunya (pronounced chik-un-GUHN-ya) is named for the joint pain it causes, literally meaning “that which bends up” in the Makonde language of southeastern Africa.



Aedes albopictus mosquito
Credit: Centers for Disease Control and Prevention

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Approximate distribution of *Aedes aegypti* in the United States*

■ Historic data (Morlan and Tinker 1965) ■ Recent information (Eisen and Moore 2013)

Approximate distribution of *Aedes albopictus* in the United States*

Credit: CDC

Yet new findings from Brazil suggest that risk to the Americas could be on the rise. Pedro Vasconcelos, director of the Evandro Chagas Institute, Brazil's confirmatory laboratory, warns that in one of the country's 26 states it has detected the more problematic African strain of chikungunya. That form of chikungunya is the second to arrive in Brazil, joining the Asian-derived strain carried by *A. Aegypti* that is already circulating throughout the Western Hemisphere, he told *Scientific American*.

The majority of Brazil's cases, Vasconcelos says, are in Bahia state along the eastern coast, the same place where the African strain is appearing, so officials think that form of chikungunya is the most common in Brazil. The country currently has more than 200 confirmed cases. Fortunately, the African strain seen in Brazil does not appear to have developed several mutations detected in Southeast Asia. Such genetic adaptations, if present, could make the virus as much as 100 times more infectious to mosquitoes, says Stephen Higgs, a chikungunya expert at Kansas State University. Such single-point mutations could still develop, however, and it is hard to predict how likely that will be, Vasconcelos says. The mutations effectively lower the threshold for what it takes for a mosquito to become infected with chikungunya, replicate the virus in its body and pass it on to humans with its bite.

Brazil's summer starts next month, a season of copious rain that will create more ideal breeding grounds for the mosquitoes, which can then go on to bite humans and spread chikungunya. The appearance of the African genotype of chikungunya "is just going to make a bad situation worse," says Scott Weaver, an expert in human infections and immunity at The University of Texas Medical Branch at Galveston.

Having two genotypes of chikungunya in Brazil will not necessarily increase the risk of spreading more chikungunya in the U.S., says Higgs. But global travel and trade could bring the strain now in Brazil to the U.S. The cooling season here will mitigate the situation, says J. Erin Staples, a medical epidemiologist with the Centers for Disease Control and Prevention. "We're getting into our winter period in the U.S., which will protect most people in the continental United States, but travelers to Brazil or other areas with chikungunya should take preventive steps," she says, referring to wearing long sleeves or pants and using potent insect repellent.

There are two top vaccine candidates for chikungunya right now, but neither has completed the rigorous testing required before they would be available to patients. One has not yet been tested in humans and the other has not made it through all the mandatory stages of testing to ensure it is effective at preventing the disease. Exactly which organization or nation might fund the mass production of these vaccines, assuming they prove effective, also remains an open question. "There are so many things we don't know about this pathogen," Higgs said November 4 at the annual meeting of the American Society of Tropical Medicine and Health, "especially when it comes into new territories."

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