

Mosquitoes -- not birds -- may have carried West Nile virus across US

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Mosquitoes -- not birds as suspected -- may have played a primary role in spreading West Nile virus westward across the United States, according to a study by researchers at the Johns Hopkins Bloomberg School of Public Health. The study is among the first to examine the role of mosquitoes in the dispersion of West Nile virus across the U.S. and is published in the March 2 edition of *Molecular Ecology*.

West Nile virus was first detected in the U.S. in 1999 in New York. Between 2001 and 2004, the virus spread rapidly across the U.S., making a large jump across the [Mississippi River](#) and into the Great Plains between 2001 and 2002. Birds are known hosts of the disease and have long been suspected of transporting the virus across the continent. They can transmit the virus to certain mosquitoes, like *Culex tarsalis*, which then can pass on the disease to humans through their bites.

"In the past, people assumed that birds played the primary role in the spread of West Nile. However, the rapid spread of West Nile did not follow a leap-frog pattern or move north to south along migratory bird routes like we would expect," said senior author Jason L. Rasgon, PhD, assistant professor with Bloomberg School's Malaria Research Institute and the W. Harry Feinstone Department of Molecular Microbiology and Immunology. "When you see such rapid movement, one of the main questions we ask is: 'What are the factors that mediated this jump?' Our study shows mosquitoes are a likely candidate."

For the study, Rasgon and his co-author, Meera Venkatesan, a former

graduate student with the Bloomberg School and current postdoctoral researcher with the Center for Vaccine Development and Howard Hughes Medical Institute, analyzed DNA from mosquitoes collected from 20 sites across the western U.S. Genetic analysis detected three distinct clusters of *C. tarsalis* populations. They found extensive gene flow between the populations, which indicated widespread movement by the mosquitoes. However, gene flow was limited in certain regions, such as Arizona's Sonoran desert, the eastern Rocky Mountains and the High Plains plateau, all three of which appear to have blocked mosquito movement. The researchers also found that the pattern of genetic clustering was congruent with the pattern of [West Nile virus](#) infection across the U.S.

"People have this idea that mosquitoes don't move very far. For certain mosquitoes that is true. But the range of this particular mosquito is as great as the range of the [birds](#) that were originally thought to move the virus," Rasgon said.

Provided by Johns Hopkins University Bloomberg School of Public Health

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