

West Nile virus passes from female to eggs, but less so from larvae to adults

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In California *Culex* mosquitoes are considered to be the principle vectors of West Nile virus (WNV), which infects birds, humans, and other mammals during the summer. In addition, these mosquitoes may also serve as overwintering reservoir hosts as the virus is passed "vertically" from female mosquito to egg, then larva, and then adult.

To find out how often this happens, California researchers monitored WNV in mosquitoes in the field and in the lab, and observed how the virus is transmitted between generations and between insect stages. The results are published in the March, 2013 issue of the [Journal of Medical Entomology](#) in an article called "Experimental and Natural Vertical Transmission of [West Nile Virus](#) by California *Culex* (Diptera: Culicidae) Mosquitoes."

In the field, the researchers captured 934 [female mosquitoes](#) and found [viral RNA](#) in 34 of them. These 34 females then laid egg rafts, and the first-instar larvae from nine of them tested positive for the virus.

In the lab, two groups of infected females were observed, one to see how many transmitted the virus to their first-instar larvae, and the other to see how many transmitted the virus all the way to the adult stage of their progeny. Overall, [transmission rates](#) were significantly higher when measured for first-instar larvae compared with adults. In the first group, they found that 23 out of 28 infected females transmitted the virus to their larval offspring, while in the second group only two out of 25 adult offspring of infected females were found to carry the virus. This

demonstrates that a considerable number of [viral infections](#) may be lost during [larval development](#) to the adult stage, but it is unclear why.

The percentage of females passing on the virus was also estimated by testing egg rafts. Interestingly, the presence of WNV in egg rafts did not ensure that the larvae would become infected. Among females transmitting to larvae, seven had negative egg rafts and positive larvae, and one had a positive egg raft and negative larvae. One possible explanation is that larvae may acquire the virus by feeding on infected egg rafts after emerging.

The authors conclude that future studies are needed to explain how WNV is vertically transmitted, if larvae can become infected by feeding on infected eggs, and why the virus seems to be frequently degraded during metamorphosis.

"This could be used as a tool for identifying foci of virus transmission during the WNV season," said Brittany Nelms, one of the authors of the study. "Although we found that the [virus](#) is lost from the larval to the adult stage, we can still identify areas where vertical transmission is taking place in nature."

Provided by Entomological Society of America

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