

Mosquito surveillance uncovers new information about malaria transmission in Madagascar

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Riley Tedrow, Ph.D., a medical entomologist at Case Western Reserve University School of Medicine, has uncovered new findings about malaria transmission in Madagascar. In a recent study published in *PLoS Neglected Tropical Diseases*, he also describes real-world application of an effective mosquito surveillance strategy using low cost traps and a recently reported tool that simultaneously tests each mosquito for its species, what it fed on, and the presence of malaria parasites.

Conducting research in remote villages in Madagascar, Tedrow discovered that female *Anopheles* mosquitoes—the only mosquitoes that can transmit malaria-bite more often and have more varied diets than typically assumed. These findings could result in better understanding of how the disease is transmitted as well as enhance malaria-prevention strategies.

Specifically, Tedrow found that feeding behavior in

the mosquitoes that he collected frequently showed evidence of multiple blood-meal hosts (single host = 53.6%, two hosts = 42.1%, three hosts = 4.3%). The predominant mosquito host was cow, followed by pig, then human.

Additionally, he discovered that the propensity for mosquitoes to feed on humans increased from 27% to 44% between December 2017 and April 2018, when he conducted the study. This suggests that host preferences could vary from season to season, again raising implications for surveillance and eradication campaigns.

Tedrow also found that certain species of *Anopheles* mosquitoes that are typically considered less important for [malaria transmission](#), and therefore more likely to be overlooked in surveillance and eradication campaigns, were often infected with the *Plasmodium* parasite that causes malaria. "This hidden reservoir of malaria parasites could hinder malaria eradication," said Tedrow. "The strategy used in this study could easily be adapted to other countries at risk for malaria, possibly uncovering equally complex transmission dynamics that may impact our approach to [disease control](#)."

In the same study Tedrow reports that QUEST, his modified, outdoor-based, tennis-net-sized trap, can supplement current mosquito-control interventions, which focus on indoor sources of malaria. "Outdoor trapping can pick up species that other sampling methods might miss out on," he said.

In addition, Tedrow describes his application in Madagascar of BLOODART, a tool he developed that combines an existing malaria test with new host and mosquito-species analysis techniques. BLOODART enables efficient evaluation of hundreds of mosquitoes by simultaneously

identifying the species of each mosquito, determining what it has fed on, and diagnosing the presence of malaria parasites, all from a single mosquito abdomen.

Despite intensive international efforts to combat the malady, there were 219 million cases of [malaria](#) worldwide and 435,000 subsequent deaths in 2017, with most (92% and 93%, respectively) occurring in Africa.

More information: Riley E. Tedrow et al, Anopheles mosquito surveillance in Madagascar reveals multiple blood feeding behavior and Plasmodium infection, *PLOS Neglected Tropical Diseases* (2019). [DOI: 10.1371/journal.pntd.0007176](#)

Provided by Case Western Reserve University

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